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DIV. INSECTS

DEPARTMENT OF AGRICULTURE,
NEW SOUTH WALES.

SCIENCE BULLETIN, No. 18.

June, 1921.

A DESCRIPTIVE CATALOGUE OF THE SCALE INSECTS ("COCCIDAE") OF AUSTRALIA.

PART II.

W. W. FROGGATT, F.L.S.,
Government Entomologist.

Workers in the respective branches of Economic Science covered by this series of Science Bulletins will receive such of them as may be of use in their special branches of study upon application to the Under Secretary and Director, Department of Agriculture, Sydney.

2178 SYDNEY: WILLIAM APPLEGATE GULLICK, GOVERNMENT PRINTER.—1921

No. of Copies issued, 1,000.

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A Descriptive Catalogue of the Scale Insects ("Coccidae") of Australia.

PART II.

SUB-FAMILY IV.—*Lecaniinæ.*

THE scale insects included in this division are distinguished from the members of the last sub-family in the females having the posterior extremity of the abdomen cleft. "The anal orifice closed above by an operculum, consisting typically of a pair of triangular hinged plates (the anal plates or anal scales), forming a valve" (Green). The adult female in the typical group (*Lecanium*) is naked, and furnished with legs and antennæ; in others it is covered with waxy, glassy, horny, cottony or felted secretions, and the legs may be rudimentary or wanting. The Lecanid larvæ are active little creatures, with well developed legs and antennæ, showing the anal cleft of the abdomen and a stout seta on either side.

Though attaching themselves to the bark or leaf surface of their food-plant, both the larvæ and the females, in the early stages of development in some of the groups, can move from place to place, and frequently do so when their food-plant has been gathered and begins to dry. The adult female coccid, naked or covered, deposits her eggs in masses between herself and the bark upon which she is feeding, the contraction of the abdominal segments forming a regular cavity in which the eggs and freshly hatched larvæ are protected until the latter emerge from beneath the dried-up remains of the female. The male larvæ, as they develop in many of the genera, construct glassy angulated or ribbed coverings within which they pupate. In some groups male puparia are very rare, in others they are unknown.

This sub-family is well represented in Australia by many fine native species peculiar to the country, and most of the cosmopolitan genera, such as the brown olive scale and the Indian wax scales have been accidentally introduced with their food-plants, and are now well established in our orchards and gardens.

The following genera are represented in Australia:—XIII *Ceronema*, XIV *Pulvinaria*, XV *Tectopulvinaria*, XVI *Lichtensia*, XVII *Signoretia*, XVIII *Ceroplastes*, XIX *Ctenochiton*, XX *Inglisia*, XXI *Ceroplastodes*, XXII *Lecanium*, XXIII *Cryptes*, XXIV *Alcerda*, XXV *Lecanopsis*.

Genus XIII. *Ceronema*, Maskell.

Trans. N. Zealand Inst., vol. xxvii, p. 55, 1894.
Cockerell, *Canadian Entomologist*, vol. xxxi, p. 330, 1899.

This genus was formed by Maskell for an Australian coccid that is allied to *Pulvinaria*. He says: "Adult female covered wholly or partially by tests of threads more or less closely woven, neither glassy, cottony or felted. Never forming homogeneous plates, no fringe. Lecanid in form, with normal cleft and lobes. Male scale covered by a glassy test of normal Lecanid form, comprised of plates more or less homogeneous."

Cockerell supplements this in his "Tables for the determination of the genera of Coccidae." Female secreting a thick mass of white waxy threads, which, however, do not cover the middle of the back; round the sides are threads spreading in all directions; antennæ six-jointed, third much the longest; legs rather slender, tibiæ longer than tarsi. Two species have been described from Australia; another has been described from China and Japan upon the tea plant, by Maskell; and a fourth upon the tea plant in Ceylon. I have another very handsome large species upon the foliage of eucalypts in New South Wales.

Ceronema banksiæ, Maskell (Figs. 1 and 2.)

Trans. N. Zealand Inst., vol. xxvii, p. 56, pl. iv, figs. 1–13, 1894.

This insect was found by me upon the leaves of *Banksia serrata*, the common "honeysuckle" of our coast, in the vicinity of Manly, N.S.W. It is a rare scale, and I have only found it three or four times in all my collecting. Fuller says that this species is found on three different species of Banksias in Western Australia.

The test or covering of the adult female is white, nearly one-third of an inch in length, broadly rounded, oval, the outer margins consisting of fine hairs resting on the surface of the leaf, with the rest forming two rolls of white waxy threads, or rather strands, folding over on either side with a parallel cleft down the centre like the parting in a man's hair, but brushed round on either side.

The adult female is therefore hidden, except down the centre of the back; she is dark, reddish brown, about one-eighth of an inch in length, oval, slightly convex, with the centre of the back smooth, but either side thickly marked with oval pores, and the outer margin of the body fringed with fine hairs. Furnished with six-jointed antennæ and small feet. The male puparium is silvery white, slender elliptical, $\frac{1}{10}$ inch in length, beautifully striated, marked with a triangular plate at both extremities.

630 *Ceronema banksiæ*. Cat. Coccidæ, p. 127.

(a) Dorsal view.

(b) Side view.

Fig. 1.—*Ceronema banksiæ.* Female.

(a) Dorsal view.

(b) Side view.

Fig. 2.—*Ceronema banksiæ.* Male.

Ceronema caudata, n.sp. (Fig. 3).

This species has been obtained by me on several occasions in the foliage of *Eucalyptus robusta* at Thirroul on the South Coast, and at Lake Toronto, near Newcastle. The felted secretionary covering is much more abundant than in *C. banksiæ*, the strands, thickened and well defined, curling round on either side and at the anal extremity, forming regular curled strands, two of which curving outward coalesce and turning back merge into the other mass forming a curled tail like the handle of a teapot. The filamentous strands are so thick on the dorsal surface that they almost touch down the centre of the back, and the regular parting is indistinct.

(a)

(b)

(a) Dorsal view.
(b) Side view.

Fig. 3.—*Ceronema caudata*, n.sp.

The general shape is broadly, irregularly round, the secretion forming rounded irregular masses on the flattened summit. Length and diameter up to $\frac{1}{4}$ inch, the curled handle or tail projecting another $\frac{1}{3}$ inch behind.

The male test, elongate, oval, semi-transparent, white, with a yellow tint from the presence of the enclosed larval male coccid. The outer margins finely crenulated and the dorsal surface formed of glassy plates forming a slender lanceolate pattern, slightly under $\frac{1}{8}$ inch in length. The adult female, reddish brown, with the outer margins lighter, broadly oval, convex, with the anal cleft very distinct, length about $\frac{1}{9}$ inch.

Ceronema dryandræ, Fuller.

Journal of Dept. of Agriculture, W. Australia, vol. iv, p. 1345, 1897.

Trans. Ent. Soc., London, p. 460, 1899.

Fuller says: "A species closely allied to *C. banksiæ*, but handsomer and easily distinguished by the form of the test, which covers the whole of the dorsum excepting a small elliptical spot towards one end. Taken upon *Dryandra florabunda and D. nivea*, near Perth, Western Australia."

631. *Ceronema dryandræ*. Cat. Coccidæ, p. 127

Genus XIV, *Pulvinaria*, Targioni-Tozzetti.

Catalogue, 1869, p. 34.

Signoret, *Ann. Soc. Ent. France*, vol. iii, p. 29, 1873.

Newstead, *Mon. British Coccidæ*, vol. ii, p. 50, 1903.

The members of this genus are closely allied to those of the last. In the earlier stages of the development of the female and during the whole of the life-history of the male coccid they do not show any structural differences. The adult female, however, when laying her eggs produces a wad of fine filaments beneath, and often surrounding, but never completely enveloping her on the dorsal surface.

Newstead says: "Adult females naked, ovisac secreted at period of parturition not enveloping the insect. Puparium of male inseparable from the puparia of Lecanium."

Sixty-one species are listed from all parts of the world, and are found upon all kinds of trees, shrubs, and even small plants. They are well represented in Australia.

Pulvinaria contexta, n.sp.

Specimens obtained at Mittagong, New South Wales, upon the twigs of *Bossiaea*, sp., and *Dillwynia juniperina*.

Adult female resting against the irregularly rounded ovisac, composed of felted white filaments without any regular structure, usually half hidden with the loose woolly matter in front. Length of female and ovisac, $\frac{1}{4}$ inch. General colour, brown. Treated with potash, transparent; cephalic portion slightly contracted, rest broadly oval, with the anal segments rounded at the tips, and a very slight shallow anal cleft; no marginal spines, and epidermis appears to be finely shagreened. Legs, slender; antennæ slender, rather long.

Male puparium composed of white crystalline plates, forming a slender box flattened on the dorsal surface with two parallel striæ meeting at the extremities; the ends truncate above, rounded on the margin; sides sloping down, divided into sections by six fine white transverse lines or ridges. Length, just under $\frac{1}{10}$ inch.

Pulvinaria darwiniensis, n.sp.

The type specimens were collected by Mr. F. G. Hill upon *Caladium*, sp., growing near Port Darwin, Northern Territory. This is a well defined species, though the females are not quite adult.

Female dull yellow, central portion darkest, margins lightest, resting upon a pad of soft white woolly secretion, with the ovisacs pure white composed of soft woolly filaments without any defined pattern extending beyond; the female slightly broader, round to the apex. Length of female, $\frac{1}{16}$ inch; with ovisac, $\frac{1}{5}$ inch.

Female broadly elongate; rounded at both extremites; slightly contracted at cephalic portion; somewhat flattened, probably convex when alive; anal segment broadly divided by a wedge-shaped cleft; anal opening apparently large. Antennæ long, slender, eight-jointed; first short, broad; second and third nearly uniform; fourth to seventh tapering, with the eighth slightly longer and pointed; legs well developed; thighs of fore pair large, tarsal joint long, tarsal claw large.

Pulvinaria dodonææ, Maskell.

Trans. N. Zealand Inst., vol. xxv, p. 222, pl. xiii, figs. 8–9, 1892.

This coccid was described from South Australia upon the foliage of *Dodonæa bursarifolia* and *Myoporum*, sp.

Maskell says: "The adult female is reddish brown, darkening with age. Before gestation the form is regularly elliptical, flattish or slightly convex, and has the appearance of a full-grown *Lecanium*; as she shrivels up she simply becomes a brown speck in a mass of cottony secretion. The variations in size and colour render it somewhat difficult to identify. Adult female, $\frac{1}{8}$ to $\frac{1}{20}$ inch in length; ovisac, $\frac{1}{9}$ inch.

656. *Pulvinaria dodonææ*. Cat. Coccidæ, p. 132.

Pulvinaria flavicans, Maskell.

Trans. Royal Society, S. Australia, p. 103, pl. xii, f. 3, 1888.
Cockerell, *Pro. Academy, Nat. Sciences, Phil.*, p. 272. 1899.

Specimens described on the foliage of an undetermined native plant from South Australia.

"Adult female yellowish brown, not globular or gall-like, slightly convex, rugose, outline sub-elliptical, naked, but producing an ovisac, upon which it rests. A fringe of short spines, very close together, right round the margin Antennæ apparently eight-jointed. Legs well developed."

666. *Pulvinaria flavicans*. Cat. Coccidæ, p. 132.

Pulvinaria floccifera, Westwood.

Gardeners' Chronicle, p. 308, f. 52. 1870.
Newstead, *Mon. British Coccidæ*, vol. ii, p. 9, pl. ii, figs. 6–7. 1902.
Pulvinaria camelicola, Sign. *Ann. Soc. Ent. France*, vol. iii, p. 32. 1873.
" *phaiæ*, King. *Entomological News*, p. 311. 1899.
" *brassiæ*, Ckll. *Canadian Entomologist*, p. 135. 1895.

This is an introduced species, recorded from New Zealand and Australia; almost cosmopolitan in its range, on many garden shrubs, such as *Camellia*, *Euonymus*, *Brassia*, *Phaius*, &c.

It is the common hothouse scale in England and France, appearing on the underside of the leaves, where, after the adult female has deposited her eggs, she usually shrivels up and, falling off, leaves behind her the white cottony ovisac enveloping the eggs.

Newstead says: "Adult female in life distinctly cordate, but becoming more wrinkled after gestation. Colour pale yellow; lower half of the body mottled with reddish brown or brightly ochreous; 2-3 mm. in length." The ovisac, either curved or straight, is usually five to eight times the length of coccid.

661. *Pulvinaria floccifera*. Cat. Coccidæ, p. 132.

Pulvinaria greeni, n.sp. (Fig. 4).

This fine species comes from Condobolin, New South Wales, infesting one of our inland scrub trees (*Myoporum deserti*). I have named it in honour of Mr. E. E. Green, who has assisted me so much in this work.

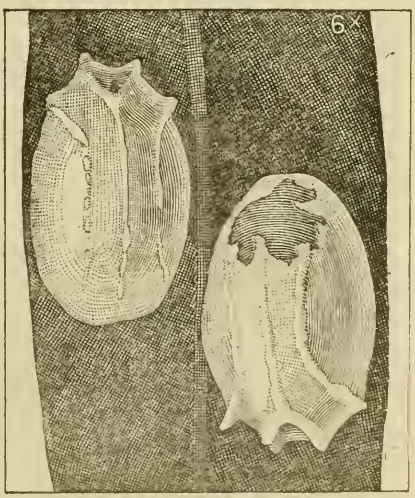

Fig. 4.—*Pulvinaria greeni*, n.sp.

Adult female after gestation, buried in the ovisac, measuring with the surrounding ovisac, $\frac{1}{5}$ inch. Much wrinkled, yellowish brown, mottled with reddish brown; ovisac white, projecting behind the coccid, broadly oval and convex, with the cottony secretion forming three distinct parallel ridges behind her. Immature female, semi-transparent to yellowish green, oval convex, broadest in front, the outer margins finely crenulated. Male puparium semi-transparent, white, forming a regular elongate box, the sides angled and the dorsal surface flat, the front sharply acute. Length, $\frac{1}{10}$ inch. Allied to *Pulvinaria dodonææ*, but the structure of the male puparium is very different.

Pulvinaria maskelli, Olliff (Fig 5).

Agric. Gazette, N.S. Wales, vol. ii, p. 667, 1891, and vol. iii, pl. iv, f. 8, p. 176, 1892.
Signoretia airiplices, Mask. *Trans. N. Zealand Inst.*, vol. xxiv, p. 23. 1892.
Pulvinaria maskelli, Mask. *Trans. N. Zealand Inst.*, vol. xxvii, p. 76, 1893.
Pulvinaria maskelli, var. *spinosior*, *Trans. N. Zealand Inst.*, p. 78, 1902.

This is the common scale upon several species of *Atriplex* and *Rhagodia* ("saltbushes"), valuable fodder plants that cover immense areas in the inland districts of Australia. When plentiful, the scale spreads all over the leaves and branchlets, and does a great deal of damage to the host plant.

Adult female with ovisac measuring up to ½ inch in length, but usually smaller, the coccid reddish brown to lighter yellowish tints; elongate, ovate, convex above, very much wrinkled and narrow in front in dried specimens, with the hind margins fitting round the front margin of the ovisac in wrinkled shell-like plates; without the ovisac, about ⅛ inch in length. Antennæ eight-jointed; third and fourth longest; legs well developed; the margin of the body showing small spines; the epidermis covered with a great number of tubular spinnerets. Ovisac white, compact, cylindrical, showing very slight parallel impressions, front margins fitting close to the female; apex rounded.

Male puparium composed of white waxy secretion, elongate, ovate in form, convex, and truncate behind; the anal setæ of the delicate two-winged male sticking out through the hole in the centre of this flattened lid or cover.

This soft scale is fortunately infested by a number of active parasites that keep it in check; among them is the small green lace-wing *Chrysopha rumburi*, and several species of the larvæ of the scale-eating moths of the genus *Thalpocharis*.

Maskell has described a second form under the name of var. *spinosior*. It was found upon the foliage of the Desert Cypress (*Frenella robusta*), and differs in the typical form in the more narrow ovisac and the large spines on the margins of the body. Other specimens of this variety come from Richmond, New South Wales, found upon a Pittosporum.

Mr. C. French, junr., sends me small specimens of this variety on the stems of *Hymenanthera dentata* from the Mallee scrub, North-west Victoria.

672. *Pulvinaria maskelli*. Cat. Coccidæ, p. 135.

Pulvinaria nuytsiæ, Maskell.

Trans. N. Zealand Inst., vol. xxix, p. 313. 1897.
Pulvinaria nuystiæ, *Trans. Ent. Soc., London*, p. 458. 1890.
Ctenochiton nuytsia, Fuller, *Journ. of Dep. of Agriculture, West Australia*, p. 1345. 1897.

Described from specimens collected on the foliage and twigs of *Nuytsia florabunda*, Perth, Western Australia. Fuller described the male scales as *Ctenochiton*, but corrected his mistake in the later paper. Fuller also

Fig. 5.—*Pulvinaria maskelli*, Olliff.

described an allied form under the varietal name of *P. maskelli* var. *viminaria*, upon the twigs of *Viminaria denudata*, and *Hakea ilicifolia* from the neighbourhood of Perth, Western Australia.

Adult female dark brown; elliptical in form when alive, much wrinkled when dead. Ovisac elongate, narrow, composed of felted white cotton. Length of female, $\frac{1}{13}$ inch, ovisac $\frac{1}{4}$ inch. A median ridge down the centre of the dorsum, margins flattened. Antennæ eight-jointed; third longest, last three sub-equal, with long hairs at the tip. Fringed with fine blunt spines round the margins. Maskell says it is allied to *Pulvinaria maskelli*, var. *spinosior*, but besides its smaller size it differs in the feet, marginal spines, and dorsal elevation.

In Mrs. Fernald's catalogue this species is simply made a variety, but I see no reason for sinking its rank.

Pulvinaria newmani, n.sp. (Fig. 6).

This fine species was collected in the Harvey district, Western Australia, by Mr. L. J. Newman, upon the twigs of an undetermined species of *Jacksonia*.

Fig. 6.—*Pulvinaria newmani*, n.sp.

Adult females thickly encrusting the twigs and branchlets. Length, with ovisac, just under $\frac{1}{2}$ inch; adult female without ovisac, after treatment in potash, over $\frac{1}{3}$ inch in length, but only $\frac{1}{10}$ inch when dried against the ovisac. Dull reddish brown, broadly oval, rounded in front, constricted behind cephalic portion on either side, swelling out to anal segment, which is deeply cleft with the extremities on either side rounded. Antennæ seven-jointed; first short, broad, second longest, third and fourth equal, fifth to seventh smaller. Rostrum well developed. Legs stout, thighs thickened, tibiæ stout at base. Whole surface covered with fine scattered spines, with a distinct fringe right round the outer margin of stout short spines.

The ovisac is composed of felted white cottony secretion, which is waved with fine transverse impressions or in others slight parallel striæ. General form cylindrical, truncate in front where in contact with coccid, but rounded on the apex.

Allied to *Pulvinaria maskelli*, but differing in the larger size. Only seven joints in the antennæ, and constricted on the sides of the thoracic segments.

Pulvinaria paradelpha, Cockerell and Lidgett.

Victorian Naturalist, vol. xvi, p. 15. 1899.

The type was found upon the foliage of a wattle (*Acacia melanoxylon*) at Mount Difficult, Grampians, Victoria.

Adult female light brown, oval, margins almost spineless; antennæ eight jointed; mouth parts small. Ovisac white, broad, flat, leathery. Length of coccid $\frac{1}{6}$ inch; with ovisac, under $\frac{1}{2}$ inch.

Allied to *P. thompsoni*, described from Tasmania by Maskell.

678. *Pulvinaria paradelpha*. Cat. Coccidæ, p. 137.

Pulvinaria salicorniæ, n.sp.

This coccid was found by Mr. C. French, junr., upon the foliage of an undetermined species of *Salicornia*, growing at Little River, Victoria. The adult female is reddish brown, with the outer margins lighter coloured; general form broadly rounded, convex, and wrinkled when dry on the dorsal surface, concave beneath; no distinctive structure after treatment with potash; antennæ small, six or seven jointed; first joint broad, short, second shorter than the third; terminal one small; legs moderate; and segment round on either side, with the angulated processes on either side of the anal opening large. Length, $\frac{1}{8}$ inch.

Ovisac composed of soft white woolly filaments forming a pad upon which the coccid rests, and extending into a round mass behind; the margin of the coccid is often buried in the woolly secretion, so that only the back shows. Length, with coccid, $\frac{1}{5}$ inch. The species was determined and given the above MS. name by Mr. E. E. Green, and was given to me at his suggestion by Mr. C. French, junr

Pulvinaria tecta, Maskell (Fig. 7).

Trans. N. Zealand Inst., vol. xxvi, p. 79, pl. iv, figs. 9–14, 1893, and vol. xxviii, p. 393. 1896.

Cockerell Bull. 4 *Tech. Series, U.S. Dept. Agr.*, p. 49. 1896.

This is one of the commonest woolly coccids in the vicinity of Sydney and along the coast, being found chiefly upon the branchlets of *Kunzea capitata* and other species of this genus. So thickly does it infest the small twigs that they are often completely enveloped for inches with balls of white loose filaments.

It has been recorded upon another native shrub (*Daviesia*, spp.) and upon the orange, but I have never seen it upon any citrus tree.

The adult female varies from dull yellow to dark reddish brown; general form oval, slightly convex; firmly attached to the bark of the twig; enveloped in the ovisac, which consists of loose, cottony, matted filaments, somewhat curled and felted, irregularly rounded, measuring often $\frac{1}{2}$ inch in diameter. The enclosed adult coccid measures about $\frac{1}{8}$ inch.

Fig. 7.—*Pulvinaria tecta*

Maskell says: "I cannot say that this species entirely agrees with the usual type of *Pulvinaria*, because it is by no means easy to distinguish clearly the insect, so much is it surrounded by the cottony mass; yet I cannot declare that it is entirely embedded. If it were so, it would probably have to be placed in the genus *Signoretia*, but it seems to suit *Pulvinaria* best It is another instance of a species on the border line of two genera.

688. *Pulvinaria tecta*. Cat. Coccidæ, p. 139.

Pulvinaria thompsoni, Maskell.

Trans. N. Zealand Inst., vol. xxviii, p. 393, pl. xx, figs. 1–8. 1896.

The type specimens come from Hobart, Tasmania, where they were collected upon the foliage of the Native Hop Bush (*Dodonæa viscosa*). "It differs from the species found upon another species of *Dodonæa* in South Australia in structural details in having eight-jointed antennæ, larger digitules of the claw, in the very small number of dermal spinnerets, in the spines of the marginal depression, in size and colour."

The adult female varies from yellow to reddish brown, general form elliptical, flattish, margin with a row of fine hairs set rather closely together; each of the marginal depressions with three or four stout club-shaped spines. Length, $\frac{1}{8}$ inch. Specimens often massed together, the twigs covered with filaments. Male puparium white crystalline, angular elliptical, sides sloping, top flattened. Length, $\frac{1}{12}$ inch.

690. *Pulvinaria thompsoni*. Cat. Coccidæ, p. 139.

Pulvinaria theæ, n.sp. (Fig. 8).

Found upon the foliage of a tea plant (*Thea viridis*) growing in a garden at Richmond, New South Wales (Mr. C. T. Musson).

Fig. 8.—*Pulvinaria theæ*, n.sp.

Adult female yellowish brown; when cleared with oil of cloves it appears to be pale yellow, blotched with brown; the outer margins semi-transparent, marbled with yellow lines, giving it a tesselated pattern. Length, $\frac{1}{8}$ inch. Anal aperture very distinct, with anal cleft rounded on either side. Legs and antennæ indistinct.

Ovisac pure white, elongate, sub-cylindrical, broadly rounded behind, the filaments showing a fluted structure with a delicate transverse wave, like a bit of merino wool. Length, nearly $\frac{1}{2}$ inch.

Genus XV. *Tectopulvinaria*, Hempel.

Revista do Musca Paulista, vol. iv, p. 482. 1900.
Annals and Magazine Nat. History, vol. viii, p. 69. 1901.

The type of this genus (*T. albata*) was described from Brazil. This is the second species from Australia on Mr. E. E. Green's determination. "Adult female secreting an ovisac as in *Pulvinaria*. Dorsum entirely covered with a white felted cotton-like secretion; antennæ eight-jointed. Male scale thin, white, narrow, elliptical, covered with a fine white secretion." (Cockerell.)

Tectopulvinaria loranthi, n.sp.

The specimens were obtained near Ryde, New South Wales, upon the foliage of a *Loranthus*, parasitic upon an undetermined species of *Eucalyptus* (Mr. J. J. Fletcher).

Adult female completely hidden by a smooth, closely felted, white ovisac, fitting close against the surface of the leaf; elongate, oval, convex, measuring, with ovisac, $\frac{1}{3}$ inch in length; much longer than broad.

Adult female, removed from ovisac, yellowish brown; nearly $\frac{1}{3}$ inch in length; broadly oval, cephalic portion broadly rounded in front, showing fine close short filaments, that may cover the whole of the dorsal surface. The central portion or sides of the thoracic segments cut into with two deep keyhole-like incisions on either side (widely apart from each other); round on the inner edge, with a fringe of four or more short brown bristles. Legs and antennæ indistinct; mouth parts prominent; rostrum long and distinct; anal segment deeply cleft, which runs back into a rounded base, widening out and giving the extremities of the anal egsment an angular form. Larva light yellow, rounded, massed together under the female in a quantity of short woolly particles.

Genus XVI. *Lichtensia*, Signoret.

Ann. Soc. Ent. France, vol. iii, p. 497. 1873.
Newstead, *Mon. British Coccidæ*, vol. ii, p. 32. 1902.
Cockerell, *Canadian Entomologist*, vol. xxxi, p. 331. 1899.
Austrolichtensia, Cockerell, *Ann. and Mag. N. H. London*, vol. ix, p. 331. 1902.

This genus was formed by Signoret for a coccid (*L. virburni*), found in gardens in Europe on several common shrubs. Thirteen species have been described Mexico, South America, and Egypt.

Newstead defines the genus as follows: "Adult female naked and more or less active up to the period of parturition, when it much resembles certain forms of *Lecanium hesperidun*. Immediately before this stage the female envelopes herself, except the cephalic portion, in a dense white felted sac. Antennæ and legs well developed. Male coccid with two long white caudal filaments, and four dorsal and four ventral ocelli. Male puparium glassy, with the coronet bifurcate at the posterior extremity."

The members of this genus only differ from those in the succeeding genus (*Signoretia*) in the structure of the males and their puparia; there is no difference in the females of the two genera.

Lichtensia hakearum, Fuller.

Lecaniodaspis? hakearum, Journal Agr. Western Australia, August, 1897, p. 1345.
Lichtensia hakearum, Trans. Ent. Soc. London, p. 457, 1899, pl. xv, fig. 3.
Austrolichtensia hakearum, Cockerell, *Ann. and Mag. N. Hist* (7), vol. ix, p. 451. 1902.

This species was found in Western Australia upon *Hakea media* and another undetermined species at Pinjarrah, Western Australia. In his first notice, Fuller placed it in the genus *Lecaniodaspis*.

Adult female brown, convex, enfolded in a spherical sac of white felted secretion; open at the anterior end, exposing the centre of the back; anal cleft small; anal ring with six hairs. Antennæ seven-jointed, legs well developed; epidermis with protruding multilocular spinnerets. Length, 0·15 inch. (Fuller.)

705. *Austrolichtensia hakearum*. Cat. Coccidæ, p. 142.

Genus XVII. *Signoretia*, Targioni-Tozzetti.

Catalogue, p. 34. 1869.
Newstead, *Mon. British Coccidæ*, vol. ii, p. 26. 1902.
Luzulaspis, Cockerell, *Ann. and Mag. N. H.*, vol. ix, p. 25. 1902.

This genus was created by Targioni-Tozzetti for the reception of a coccid, which Dufour has described under the name of *Aspidiotus luzulæ*. Cockerell has created a new genus (*Luzulaspis*) for this insect. I follow Newstead, who has retained the second name.

Newstead says: "Adult female narrowly elongate; antennæ eight-jointed, and legs well developed. Anal ring with six hairs. Ovisac of female very elongate, sometimes clavate, closely felted, and open at the narrow anterior extremity. Male with short styliform genital armature. No caudal filaments. Male puparium glassy, elongate, with the ends rounded and rather deep; perpendicular sides, which give it a somewhat box-shaped form."

Signoretia luzulæ, Dufour.

Aspidiotus ? luzulæ, *Ann. Soc. Ent. France*, vol. iv, p. 208, pl. 5, p. 4. 1864.
Signoretia clypeata, Targ.-Tozz. Catalogue, p. 34. 1869.
„ *luzulæ*, Sign. *Ann. Soc. Ent. France* (5), vol. i, p. 427. 1871.
„ „ Maskell, *Trans. N. Zealand Inst.*, vol. xxvi, p. 80. 1893.
„ „ *var. australis*, *Ibid*, vol. xxvi, p. 80. 1893.
„ „ „ „ Fuller, *Trans. Ent. Soc. London*, p. 457. 1899.
Newstead, *Mon. British Coccidæ*, vol. ii, p. 27, pl. xl, figs. 1–12. 1902.

The typical form of this genus was originally described from France and England upon several species of rushes, belonging to the genus *Luzula*.

In 1892, Maskell determined specimens, probably introduced from Europe, upon grass collected at Nevertire, New South Wales. In the following year he suggested, chiefly on account of its greater size, that it might be defined as var. *australis*. Fuller recorded the identification of this species upon a sedge in Western Australia in 1899.

Adult female yellowish brown, enclosed in a narrow elongated convex sac, composed of closely felted white cotton. Antennæ eight-jointed, third and fourth longest. The margin of the body bears some small spines, and the epidermis covered with tubular spinnerets.

Newstead's description hardly agrees with Maskell's, for he says, "Ovisac composed of closely felted white wax." I have never seen this species.

706. *Luzulaspis luzulæ*. Cat. Coccidæ, p. 143.

Genus XVIII. *Ceroplastes*, Gray.

Spicilegia Zoologica, p. 7, pl. iii, figs. 6–7. 1830.
Signoret, *Ann. Soc. Ent. France* (5), vol. ii, p. 35. 1872.
Maskell, *Trans. N. Zealand Inst.*, vol. xxv, p. 214. 1892.
Green, *Coccidæ of Ceylon*, Part iv, p. 268. 1909.

The coccids included in this genus are popularly known as " wax scales " from the large amount of waxy, or, rather, greasy white secretion encrusting the adult females. This material is exuded by the female larvæ as soon as they attach themselves to the bark or foliage, and it accumulates with the growth of the coccid until at the adult stage it consists of a mass several times larger than the coccid beneath. The male puparia are very rare, but in the one species where they have been identified they have the glassy box-shaped characters of the male *Lecanium*.

The adult female, removed from the enfolding secretion, is more or less hemispherical in form, allied to the Lecanid type, but often much softer; in most cases furnished with six-jointed antennæ, of which the third is the longest, and with well developed legs; the derm, or skin, without any special characteristic markings.

The female is very prolific, large numbers of rounded eggs accumulating beneath the coccid, and as she withers up the wax hardens and the minute larvæ crawl out and quickly infest the foliage.

This genus seems to be sub-tropical; of the sixty species described, most of them come from Mexico and South America; others from Africa and India; one species is described from Australia, but it is very probable that its native home is Ceylon.

Ceroplastes ceriferus, Anderson (Fig. 9).

Coccus ceriferus, Monog. Cocci ceriferi. 1791.
Ceroplastes chilensis, Gray, *Spicilegia Zoologica*, p. 7. 1830.
„ *australiæ*, Walker, *Cat. Brit. Mus. Homoptera*, vol. iv, p. 1087. 1852.
„ *ceriferus*, Sign., *Ann. Soc. Ent. France* (5), vol. ii, p. 40. 1872.
„ „ Mask., *Trans. N. Zealand Inst.*, vol. xxv, p. 216. 1892.
„ „ Green, *Coccidæ of Ceylon*, Part iv, p. 270. 1909.

The species is very common in Australia, where it is generally known as the " White Wax " or " Indian Wax Scale." Introduced at a very early date with ornamental shrubs from India or Ceylon, it has spread all over the garden plants, and from them into the waste lands and orchards. In the waste lands it has a great preference for the " native blackthorn " (*Busaria spinifera*), but it is also found on many other plants and trees. In the orchard it chiefly infests citrus trees, but it is particularly fond of the persimmon, sometimes infesting every twig and branchlet if neglected. Adult female reddish brown (in the earlier stages varying from pink to rich red);

outer surface soft; dorsal surface convex; outer margins irregular; under surface flattened or slightly concave; legs and antennæ well developed; anal segment produced into a distinct elongate tail. Length variable, up to $\frac{1}{3}$ inch.

Puparium under normal conditions composed of a mass of pure white secretion, forming a thick coating of a greasy, waxy, watery mass, rounded and convex on the summit, but irregularly depressed round the sides, like a

Fig. 9.—*Ceroplastes ceriferus.*

small loaf of bread. This completely encrusts the coccid, so that the outward appearance of the white wax scale is that of the puparium. Diameter, up to nearly $\frac{1}{2}$ inch.

The presence of this coccid often produces quantities of black smut or fumagine, which cover the infested twigs, branches, and foliage, and even the coccids themselves.

744. *Ceroplastes ceriferus.* Cat. Coccidæ, p. 149.

735. *Ceroplastes australiæ.* Cat. Coccidæ, p. 148.

Ceroplastes floridensis, Comstock.

Report United States Department of Agriculture, 1880, p. 331. 1881.

This is a cosmopolitan species, originally described from the United States, but found all over India, Japan, West Indies, and the Hawaiian Islands. It is recorded upon many fruit-trees and shrubs, and in Mrs. Fernald's catalogue is reported from Australia, but if so it is a rare and comparatively unknown coccid in this country.

758. *Ceroplastes floridensis*. Cat. Coccidæ, p. 152.

Ceroplastes rubens, Maskell (Fig. 10).

Trans. N. Zealand Inst., vol. xxv, p. 214, pl. xii, figs. 6–10. 1892.
Ceroplastes myricae, Green, *Indian Museum Notes*, vol. v, No. 18, p. 8. 1900.
Ceroplastes rubens, Green, *Coccidæ of Ceylon*, Part iv, p. 273. 1909.

Though originally described from Australia, it is probable that this coccid, which is commonly known as the "Red Wax Scale" was introduced into this country from Ceylon and from there spread to Japan and the Hawaiian Islands. It is comparatively rare on any of our native shrubs, but common in gardens, especially in our Botanic Gardens where it attacks many eastern

Fig. 10.—*Ceroplastes rubens.*

shrubs such as tea, mango, various palms, ficus, ivy, &c.; on large-leaved trees the coccids have the curious habit of following up the ribs of the leaf, so that when badly infested the whole upper surface of the leaf often has a regular pattern outlined upon it; at other times they thickly encrust the small twigs, and blacken the foliage of the whole tree. *C. rubens* has been recorded upon plum, pear, and orange trees, but it is not a common scale in orchards in Australia.

Adult female reddish brown; dorsal surface convex; under surface concave; a little longer than broad; anal segment elongate, forming a pig-like extremity; anal cleft small; legs small, six-jointed antennæ, with the third joint longest. Length, $\frac{1}{10}$ inch.

Puparium formed of pale pink, hard, semi-opaque crystalline wax, in which the adult female is closely encased, which gives the outer covering a much deeper reddish tint. General form irregularly rounded, with the dorsal centre convex, but the outer edges irregularly rounded and impressed; marked with bands of opaque white wax. Length, $\frac{1}{8}$ to $\frac{1}{6}$ inch.

782. *Ceroplastes rubens.* Cat. Coccidæ, p. 156.

Ceroplastes rusci, Linnæus.

Coccus rusci, *Syst. Nat. Edition*, p. 456. 1758.
Ceroplastes rusci, Signoret. *Ann. Soc. Ent. France*, vol. ii., p. 35, pl. 7, f. 1. 1872.
Ceroplastes rusci, Newstead. *Trans. Ent. Soc., London*, p. 101. 1897.

This species has been described under a number of different names, and was first recognised as *coccus rusci* by Signoret, who gave a good description of this coccid, and figures the three different forms of the puparium that were described by Costa, 1835, under three different names.

The adult female is enveloped in a mass of white waxy secretion, mottled on the apex and in the inner ring with brownish tints, and might be likened to a tiny cottage loaf with the central portion pressed down; it is broadly oval, with the outer margin crimped and forming a raised crimped ring round the raised central portion, which sometimes has the centre convex and in others has a slight depression in the centre. Length, 5mm.; height, 2mm. It might be mistaken for a small form of *Ceroplastes ceriferus*, only it is more regular in shape.

This coccid has a wide range, from Europe to Algeria, British Guiana, Japan, and Australia, and is recorded upon holly, myrtle, and wormwood. Specimens identified by Mr. E. E. Green have been received from Mr. G. F. Hill on *Melaleuca* sp. from Townsville, Queensland. It is also very plentiful in company with *Ceroplastes rubens* on the *Melaleuca* growing in the vicinity of the Tweed River, N.S.W.

783. *Ceroplastes rusci.* Cat. Coccidæ, p. 156.

Genus XIX. *Ctenochiton*, Maskell.

Trans. N. Zealand Inst., vol. xi, p. 208. 1878.
Cockerell, *Canadian Entomologist*, vol. xxxi, p. 332. 1899.

This genus contains fifteen species described from New Zealand, Australia, Mexico, and Brazil. As nine are peculiar to New Zealand, and four indigenous to Australia, it is evidently representative of this region.

Maskell says: "Test of female waxy, with a single fringe of tooth-like more or less broad segments round the edge. The margin of the body in the second stage of the development of the female usually presents a waxy appearance, formed by a series of re-entering curves." Antennæ, six or seven jointed.

"The presence of the fringe at some period of the female's development distinguishes all the members of this genus from those of *Ceroplastes* and *Vinsonia*."

Ctenochiton araucariæ, Green.

Anns. and Mag. Nat. History (7) vol. vi, p. 449, pl. xi, figs. 2–2*a*. 1900.

This species was found upon the foliage of Bunya pine (*Araucaria* sp.) in Victoria. Green placed it in this genus somewhat doubtfully, as it differs from the typical members in the female having no felted or cottony covering.

Adult female oblong, oval, strongly convex on dorsal surface, naked or covered with an imperfect coating of brittle waxy plates. Colour, dark chestnut. The dorsal surface very rugose, with a well-defined median ridge. Antennæ, eight-jointed; legs stout; anal scales usually widely divergent; anal ring with six stout hairs margined with stout spines. Length, 5 mm. Breadth, 3-3½ mm.

794. *Ctenochiton araucariæ*. Cat. Coccidæ, p. 159.

Ctenochiton cellulosus, Cockerell.

Victorian Naturalist, vol. xvi, p. 88. 1899.

Type specimens of this species found upon the foliage of a ti-tree (*Melaleuca nodosa*) at Myrniong, Victoria.

Adult female reddish brown, with a margin of short spines; mouth parts small; antennæ slender, composed of eight segments; anal ring with six bristles.

Puparium white, waxy, with yellowish tint, regularly rounded, without keels, convex, rugose, dotted all over with large air cells, without any true fringe. Length, $\frac{1}{6}$ inch.

796. *Ctenochiton cellulosus*. Cat. Coccidæ, p. 159.

Ctenochiton eucalypti, Maskell (Fig. 11).

Trans. N. Zealand Inst., vol. xvi, p. 52; pl. iii, figs. 1–12. 1894.

This species was found in all stages of development upon the foliage of *Eucalyptus siderophloia* in the Maitland and Newcastle districts, New South Wales.

Adult female dark-reddish brown, with the whole of the dorsal surface covered with white waxy plates, irregular in form; these plates are so brittle that they are often more or less broken away, leaving the female exposed. General form convex, broadly elliptical, with four transverse impressions on the outer portion of the thoracic segments, and fringe of fine hairs round the outer margin, antannæ and legs well developed. Length, $\frac{1}{7}$ inch.

Fig. 11.—*Ctenochiton eucalypti.*

Male puparium white, semi-transparent, formed of a number of glassy plates, broadly oval margins flattened, centre convex. The central portion formed of three plates, with larger quadrangular plates on the sides. Length of male puparium, $\frac{1}{10}$ inch.

801. *Ctenochiton eucalypti.* Cat. Coccidæ, p. 160.

Ctenochiton rhizophoræ, Maskell.

Trans. N. Zealand Inst., vol. xvi, p. 54, pl. iii, figs. 13–17. 1894.

Collected upon the foliage of the mangrove (*Rhizophora mucronata*) at Brisbane, Queensland.

Adult female greyish brown, oval, convex, with rather long marginal spines; abdominal cleft and lobes normal. Length, $\frac{1}{8}$ inch.

Female puparium consisting of plates of dull white wax on margins, and forming a broad irregular mass in the centre of back of female, striated on the sides.

Maskell says: "This species comes nearest to *C. flavus* from New Zealand, and differs from *C. eucalypti* in colour, in the characters of second stage in smaller larvæ, and long marginal hairs.

807. *Ctenochiton rhizophoræ.* Cat. Coccidæ, p. 161.

Ctenochiton serrata, n.sp.

This beautiful species was collected by Mr. L. J. Newman, on the leaves of an undetermined species of *Acacia*, at Geraldton, Western Australia.

Adult female reddish brown, flattened, elongate, oval, with the central portion showing a slight dorsal stripe; anal cleft triangular with the extremities of the anal segment rounded and turning inwards. Length, $\frac{1}{7}$ inch.

The whole dorsal surface covered with chrystalline wax, produced in short angular thorn-like plates; the central portion consisting of four parallel rows of semi-transparent wax, with the outer margin fringed with a projecting rim of much larger angular plates of bright yellow wax. This wax is easily removed with chloroform, leaving the naked, elongated, oval coccid exposed to view.

The male test is shaped like a slipper, rounded at the toe and truncate at the hind margin; the rounded dorsal surface covered with pale crystalline plates of irregular shape, with the front and margins yellow, the former covered with short waxy spines.

Ctenochiton transparens, n.sp (Fig. 12).

This curious species was obtained by Mr. L. J. Newman upon the foliage of an undetermined species of *Acacia*, near Geraldton, Western Australia.

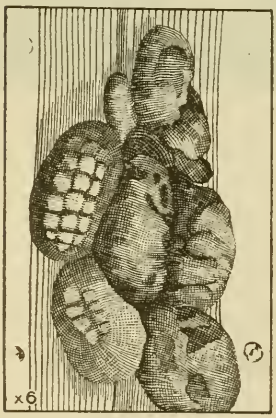

Fig. 12. *Ctenochiton transparens.*

The adult female is enveloped in an oval rounded mass of pale yellow waxy matter, with no apparent structure on the dorsal surface, but on the margins against the leaf produced into a fringe of irregular flattened angular plates, right round the margin. Cleared of the waxy matter, the female measures $\frac{1}{5}$ inch in length; dull yellow, mottled with dark-brown; convex longer than broad, with the cephalic region rather narrow in front, and the anal segment contracted almost into a peg at the extremity; the dorsal surface covered with irregularly rounded pits, forming two parallel rows down the centre and a similar band round the sides. Viewed from the under surface the coccid is dried up to a thin shell, and might be likened to a dish cover with a tuft of cottony secretion occupying the centre of the cavity. Short, stout antennæ and small legs, very prominent, standing out from the surface. Anal segment contracted; when treated with potash shows each side forming a broad rounded tip.

Treated with potash there appears to be no distinct structure in the epidermis; antennæ small, indistinct, legs small.

Male tests composed of white crystalline wax, showing no defined plates on the back, but produced into blunt spines in front and round the margin. General form very much rounded, longer than broad, but broader in proportion to length than usual; rounded in front, truncate behind.

Genus XX. *Inglisia*, Maskell.

Trans. N. Zealand Inst., vol. xi, p. 213. 1878.
Coccidæ of New Zealand, p. 75. 1887.

This genus was created by Maskell to contain five species of lecanid coccids he described from New Zealand. He defined it thus :—"Test of female glassy, elevated, striated with radiating rows of air cells. Fringe not always present in the adult stage."

The remarkable tests are constructed in several sections of hard glassy plates, finely striated, forming a shell around the adult coccid. In the New Zealand species these tests are more or less pointed at the apex, but on the Australian forms the two main sections are impressed on the summit with an elongate, narrow, deep depression. The adult female coccid is convex, corrugated, and furnished with legs and antennæ. Other species have been described from Mexico, India, and Trinidad. Cockerell in determining a species allied to the Australian forms, with the impression on the dorsal surface of the test, placed it and our two Australian species in a new genus he called *Cardiococcus*, the only point of difference from *Inglisia* being the dorsal pit in the female test.

I have retained our species in Maskell's genus, for it seems to me that a transverse depression in the otherwise similar test of a coccid is hardly sufficient to remove it from the group under which it is well known to writers on Coccidæ.

The species have a very wide range in Australia.

Inglisia foraminifer, Maskell (Fig. 13).

Trans. N. Zealand Inst., vol. xxv, p. 213, pl. xii, figs. 1–5. 1892.
Fuller, *Journal of Department of Agric., Western Australia*, p. 1345. 1897.
Fuller, *Trans. Ent. Soc. London*, p. 460. 1899.
Cardiococcus foraminifer, Cockerell, *Ann. and Mag. N. H.* (7), vol. xi, p. 156. 1903e

This, like the following species, has a wide range over Australia. The type was described from South Australia, on the Quandong tree (*Santalum acuminatum*) (Tepper). It has been found near Geraldton, Western Australia, on a *Loranthus* parasitic on the same tree (Lea). Fuller described this one, under the name of *loranthi* as a new variety, but the only difference from the typical form is the absence of legs in the adult female coccid. I have collected it at Yass, New South Wales, and in several other western localities on undertermined shrubs.

Fig. 13.—*Inglisia foraminifer.*

Adult female rich dark-brown, filling the whole of the test; concave beneath with central depression on the back, corresponding with that on the test. Antennæ thick, conical, six-jointed; feet, very small; margins of occid fringed with spines; abdominal cleft conspicuous. Length, about $\frac{1}{14}$ inch.

Female tests massed together all over the twigs and leaf stalks, with a general appearance of little limpets, composed of light-brown semi-transparent glassy plates, very finely striated, forming a conical structure in two sections, fitting close together, but easily separated. At the apex is a narrow, keyhole-like, deep depression or pit, in both sections, causing the apex of each test to become truncated. Length, $\frac{1}{13}$ inch. Specimens from Western Australia are much larger.

Male tests of a similar structure, but more elongate, smaller, not impressed at the apex, which is truncated and furnished with a hinged plate, by means of which the imprisoned male is able to emerge when he reaches maturity.

809. *Cardiococcus foraminifer*. Cat. Coccidæ, p. 161.

Inglisia fossilis, Maskell.

Trans. N. Zealand Inst., vol. xxix, pl. xx, figs. 1–4. 1897.
Cockerell, *Ann. and Mag. N. H.* (7), vol. xi, p. 156. 1903.

This species was described from specimens obtained on an undetermined species of Acacia at the Darling Range, Western Australia (Lea); others were collected on a polygonum (*Muhlenbeckia adpressa*), Murray River, Victoria (French). I have taken it upon an undetermined shrub, near Warialda, New South Wales. Maskell described the Victorian specimens under the varietal name of *major*, the chief difference being the larger size and green tint.

Adult female, dark, glossy brown; general form, conical, margins slightly flattened; antennæ and feet absent; abdominal cleft wide and narrow, the margin of the body with minute spines.

The female test is formed in a similar manner to that of the previous species though more deeply and broadly impressed at the apex; more cone-shaped, and not so much divided at the apex as shown in Maskell's plate. General colour yellowish brown, with the margins glassy. Length, $\frac{1}{7}$ inch; width, $\frac{1}{8}$ inch; height, $\frac{1}{9}$ inch.

Maskell says: "This species is allied to *I. foraminifer*, but differs in the form of the test, in the absence of feet and antennæ, and in other particulars. It is viviparous, the female being usually full of larvæ."

810. *Cardiococcus fossilis*. Cat. Coccidæ, p. 162.

Genus XXI. *Ceroplastodes*, Cockerell.

The Entomologist, vol. xxvi, p. 350. 1893.
Canadian Entomologist, vol. xxxi, p. 333. 1899.
Green, *Coccidæ of Ceylon*, Part iv, p. 284. 1909.

This is a small genus containing six described species, three of which come from New Mexico, two from Ceylon and India, and one from Australia. In the original description, Maskell placed our species doubtfully in the genus *Eriochiton*.

The members of this genus, like those of the genus *Inglisia*, are enclosed in a glassy test, which differs in being convex, but not cone-shaped, not divided at all, but rough or covered with protuberances. A more or less hemispherical scale, covered with dorsal knobs. "Legs and antennæ well developed. Stigmatic clefts well defined; each cleft with a single, very long pointed, stigmatic spine. Margin of body with a fringe of stout conical spines, usually in two or more rows. Other characters as in *Lecanium*." (Green).

Differs from *Inglisia* and *Ctenochiton* in having the body of the adult female shrinking up, and allowing for a cavity for the eggs and larvæ.

Ceroplastodes melaleucæ, Green.

Eriochiton ? *melaleucæ*, Victorian Naturalist, vol. xvii, p. 12. 1900.

This species was found upon a ti-tree (*Melaleucanodosa*) growing at Myrniong, Victoria.

Adult female oblong, oval, rather convex, with a complete marginal series of pointed conical spines, and a long curved spine at each stigmatic cleft. Anal ring with six short hairs; anal lobes irregularly triangular; apex bluntly rounded and incurved. Length, about $\frac{1}{8}$ inch.

Puparium or test of female sub-globular or hemispherical, somewhat longer than broad, completely enclosing the coccid, "compact glassy or waxy brittle plates, roughened with numerous irregular waxy granules, which give it the appearance of being closely set with grains of white quartz sand." Oval aperture above the anus. Length, about $\frac{1}{6}$ inch; breadth, $\frac{1}{10}$ inch.

828. *Ceroplastodes melaleucæ*. Cat. Coccidæ, p. 164.

Genus XXII. *Lecanium*, Burmeister.

Handbook of Entomology, vol. ii, p. 69. 1853.
Signoret, *Ann. Soc. Ent. France*, vol. iii, (5), p. 396. 1873.
Fernald, *Canadian Entomologist*, vol. 34, p. 177. 1902.
Newstead, *Mon. British Coccidæ*, vol. ii, p. 75. 1903.

This cosmopolitan genus is well represented in Australia by a number of indigenous as well as many foreign species that have been accidentally introduced with their food-plants.

The adult females are naked, in a few species slightly floury or thinly covered with a fine varnish; very variable in form, from almost flat to oval, convex, and almost hemispherical, but becoming quite hollow beneath after egg-laying; retaining legs and antennæ; skin covered with simple glands, reticulations, or many-sided cells. Propagating without any ovisac, the whole body, as it shrivels up from beneath, forms a stout shell, protecting the eggs or living larvæ, after the death of the mother. So that in the adult female *Lecanium*, the characteristics of the coccid, in the earlier stages of her development, though still retained, are difficult to examine.

In the *Canadian Entomologist* (vol. 33, p. 57, 1901), Messrs. Cockerell and Parrott published a paper dealing with this genus ("Table to separate the genera and sub-genera of *Coccidæ* related to *Lecanium*,") in which they have subdivided the original genus out of existence. Mrs. Fernald, who doubts the validity of the genus *Lecanium*, follows their nomenclature in her catalogue, and the name of *Lecanium* is eliminated from the list of genera, and the *supposed type* is placed in the genus *Coccus*.

I have, however, retained this genus in dealing with our species, and, from an economic point of view, think it a very great pity that such a doubtful question of nomenclature should have been proposed and followed by many writers in the United States. I endorse Mr. Newstead's remarks when he says: "Seeing that I have already referred to the genus as a whole under the old name of *Lecanium*, it would, I think, be extremely unwise to adopt any of the subdivisions in this work, especially as many of the characters are extremely trivial and inadequate, and would tend rather to embarrass the student than otherwise."

Lecanium anthurii, Boisduval.

Chermes anthurii, *Ent. Hort.*, p. 328. 1867.
Signoret *Ann. Soc. Ent. France* (4), vol. viii, p. 843. 1868.
Signoret (Ser. 5), vol. iii, p. 435. 1873.
Maskell, *Trans. N. Zealand Institute*, vol. xxv, p. 219. 1892.

This species, originally described from Europe upon hothouse plants and recorded from America, has been identified by Maskell from specimens from Victoria infesting asparagus.

General colour of adult female, brownish yellow, convex, rounded, but more flattened than *L. hemisphericum*; length, 2½ mm. Derm, with a pattern of oval marks, not conjoined, with a median clear space in the centre of each.

983. *Saissetia anthurii*. Cat. Coccidæ, p. 200.

Lecanium berberidis, Schrank. (Figs. 14 and 26.)

Coccus berberidis, Fauna Boica, vol. ii, pt. 1, p. 146. 1801.
Signoret *Ann. Soc. Ent. France* (5), vol. iii, p. 414. 1873.
Maskell, *Trans. N. Zealand Institute*, vol. xxix, p. 311, 1897, and vol. xxx, p. 237.

This is our largest dull-brown *Lecanium*, common on the grape vines, originally described from France. It was discovered in Victoria on vines, and doubtfully identified by Maskell in 1897 as this introduced scale, and he confirmed his determination in the following year. Until the last few years it was unknown in New South Wales, but at the present time it is very common in the vicinity of Sydney, and is spreading in our vineyards.

Adult female, reddish brown, slightly mottled with a darker tint, elongate, broad in proportion, very convex, slightly rugose on the back, with a short keel behind the anal cleft. The form is, however, very irregular when massed together; encircling the vine cane, they are much shorter and more rounded, and the margins are more impressed than in an isolated specimen. Length, $\frac{1}{3}$ inch, width up to $\frac{1}{5}$ of an inch.

Treated with oil, the derm appears to be mottled reddish brown and yellow central portion shield-shaped, irregularly marbled, encircled with a dark ring, with the outer edge yellow.

Newstead, in his description of *Lecanium persicæ*, says: "With regard to *L. berberidis*, *L. rugosum*, and *L. westeriæ*, I have little doubt in my own mind that they are also referable to *L. persicæ*." If Maskell's determinations of the two species are correct, his *L. persicæ* and *L. berberidis* are certainly distinct species.

914. *Eulecanium berberidis*. Cat. Coccidæ, p. 182.

Lecanium cappari, n.sp.

A western scale, common on the foliage of the "Wild Orange Bush" (*Capparis mitchelli*), wherever this prickly shrub occurs in the western scrubs of New South Wales. The adult female is a dark chocolate brown, with the edges lighter coloured; broadly rounded, convex, with the margins narrow, but finely crimped along the edge, and a short transverse carina on either side. Often variable in form, with the anterior portion constricted, so that the posterior portion is more broadly rounded and depressed below the anal orifice. The dorsal surface is opaque and covered with a fine waxy secretion. Length, $\frac{1}{5}$ of an inch.

Treated with oil, the whole of the central area is an elongate oval shield with egg-shaped structures pointing outward, again encircled with a band of fine tesselated markings and the margin perfectly clear.

In the immature females the coloration is much lighter, with the margin yellow, and the form more elongate oval, with a slight dorsal carina. Male tests white, semi-transparent, elongate oval, flattened, with a white line on either side, converging to a point at the posterior angle. Lateral plates finely crenulated on the margins. Length, $\frac{1}{15}$ of an inch.

Lecanium casuarinæ, Maskell.

Trans. N. Zealand Institute, vol. xxx, p. 240, pl. xxvi, figs. 9–14. 1898.

This curious species was collected in the deserted chambers of some Hepalid moth larvæ in the stem of a Sheoak (*Casuarina*, sp.), at Myrniong, Victoria. I have a series of specimens of a closely allied if not the same species, found in a cavity under the dead bark of an injured Native Cypress (*Frenella robusta*).

Adult female, semi-globular, deep shining red, with the thickened margin black. Dorsum sometimes smooth, in others with one longitudinal and two transverse carinæ. Diameter, $\frac{3}{8}$ of an inch. Under surface convex, forming a regular box, no feet or antennæ; but when treated with potash, rostrum spiracles and abdominal lobes visible.

1022. *Lecanium casuarinæ*. Cat. Coccidæ, p. 211.

Lecanium depressum, Targioni-Tozzetti.

Studie Sul. Coccid., p. 29, 1867; *Cat. Coccidæ*, p. 37. 1869.
Signoret, *Ann. Soc. Ent. France* (5), vol. iii, p. 439. 1873.
Douglas, *Ent. Month Mag.*, vol. xxiv, p. 27. 1887.
Maskell, *Trans. N. Zealand Institute*, vol. xxv, p. 220. 1892.

An introduced European species, chiefly confined to hothouse plants, where it has been recorded in New Zealand, and discovered infesting vines and a Needlebush (*Hakea*, sp.) in New South Wales. It is also recorded from the West Indies, Brazil, and the Hawaiian Islands.

The adult female is reddish brown to black in colour; elliptical, more or less convex in form; length varying from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch. Antennæ eight-jointed, feet rather long. Derm marked with small irregular cells, closely conjoined, forming a regular pattern, with a clear spot in the centre of each cell. Immature females light brown, more flattened, and often showing longitudinal ridges.

Maskell, in a paper in the *Entomologist* (1894), "Remarks on Certain Genera of Coccidæ," considers that *Lecanium begoniæ*, *L. nigrum*, and this species are probably identical. If this is the case, priority of nomenclature would make this a synonym of *Lecanium nigrum*.

987. *Saissetia depressa*. Cat. Coccidæ, p. 201.

Lecanium expansum, Green (Fig. 15).

Indian Museum Notes, vol. iv, p. 9. 1906.
Coccidæ of Ceylon, pt. ii, p. 235, 1904, pl. 86.
Paralecanium expansum, Cockerell and Parrott, *The Industrialist*, p. 207. 1899.

The type specimens were described by Green upon the foliage of *Dalbergia* and *Litsea* from Ceylon. I obtained it upon the leaves of the Moreton Bay Fig (*Ficus macrophylla*), in the public gardens at Maryborough, Queensland, the greater part of the surface of the leaves being thickly coated with black smut, caused through the presence of these coccids.

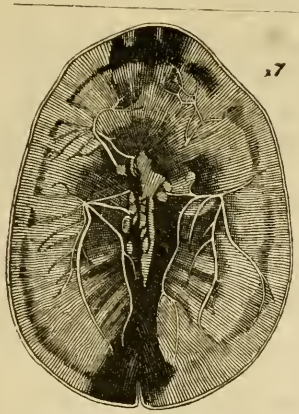

Fig. 14

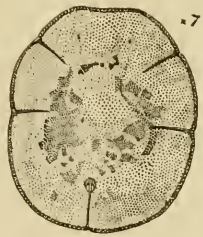

Fig. 15.

Fig. 16

Fig. 17

Fig. 18.

Fig. 19.

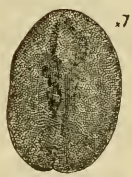

Fig. 20.

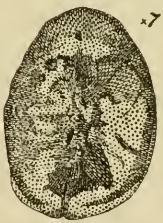

Fig. 21.

Fig. 22.

Fig. 23.

Fig. 24.

Fig. 25.

Fig. 14.—*Lecanium berberidis.* Fig. 15.—*Lecanium expansum.* Fig. 16.—*Lecanium filicum.* Fig. 17.—*Lecanium frenchi.* Fig. 18.—*Lecanium hemisphæricum.* Fig. 19.—*Lecanium melaleucæ.* Fig. 20.—*Lecanium nigrum.* Fig. 21.—*Lecanium oleæ.* Fig. 22.—*Lecanium pattersoniæ.* Fig. 23.—*Lecanium scrobiculatum* adult. Fig. 24.—*Lecanium scrobiculatum,* immature. Fig. 25.—*Lecanium tessellatum.*

Species of *Lecanium* treated with oil of cloves, and drawn from microscopic mounts.

Adult female pale yellow, with a greenish tint, when alive upon the foliage, marked with reddish brown. General form, irregularly rounded, very much flattened, thin, with the dorsal surface under the lens showing a delicate, silver-tinted shagreened sheen; the cephalic portion furrowed with two deep, widely separated, short, transverse lines; the anal cleft long and well defined. The immature females very thin, semi-transparent pale yellow.

976. *Paralecanium expansum.* Cat. Coccidæ, p. 199.

Lecanium filicum, Boisduval (Fig. 16).

Chermes filicum, Ent. Hort., p. 335. 1867.
Packard, *17th Report Mass. Bd. Agri.* p. 260. 1869–70.
Douglas, *Ent. Month. Mag.*, vol. xxiv, p. 28. 1887.
Maskell, *Trans. N. Zealand Institute*, vol. xxv, p. 220. 1892.

This is the common fern scale, originally described from Europe, but now found in many parts of the world, having been introduced with cultivated ferns in hothouses. It is common in the Botanic Gardens of Sydney upon ferns.

Adult female dull reddish brown; treated with oil of cloves, it becomes rich golden yellow, with a few deeper yellow-coloured blotches in the centre, and a dark band encircling the whole of the back, with a lighter coloured margin. The whole derm is tessellated with small, irregularly separated spots.

General form that of *Lecanum oleæ*, but smooth and more rounded, without the keel or ridges, and of a lighter brown tint when on the food-plant. Douglas says: "Female scale, short, broad-oval, very convex, smooth, with two anterior and two posterior, slight blunt carinæ going rather obliquely from the back to the margin, thus interrupting the curve of the contour, and sometimes two or three short and sharp vertical carinæ at the sides joining the margin, which is broad and flat. Antennæ, eight-jointed, third longest; articulation of tibiæ and tarsi very distinct."

Allied to *Lecanium hemisphæricum*, having a flattened margin, but distinguished by the carinæ. Green considers it a smaller and more angular form of *L. hemisphæricum*, usually found on ferns.

990. *Saissetia filicum.* Cat. Coccidæ, p. 201.

Lecanium frenchi, Maskell (Fig. 17).

Trans. N. Zealand Institute, vol. xxiii, p. 17, pl. iv, figs. 1–8. 1890.
Paralecanium frenchi, Cockerell and Parrott, *The Industrialist*, p. 227. 1899.

The type specimens were found upon a honeysuckle (*Banksia australis*), growing near Melbourne, Victoria.

This is a very handsome, elongate, oval, broadly-rounded scale, slightly convex; general colour, dark brown. The central part of the back is beautifully tessellated, with the outer margin finely ribbed or ridged on the margin along the sides, more irregular at the extremities. Diameter, $\frac{1}{8}$ inch. These details are brought out very clearly when treated with oil of cloves.

Maskell says: "The rich black colour and the curious fringe of small fans on the margin very clearly distinguish this insect. It would belong properly to Dr. Signoret's first series of the genus *Lecanium* (*Essai*, p. 226), though exceptional in its oviparous habit, and nearest possibly to *L. tessellatum*. But no species hitherto reported (as far as I know) exhibits a similar fringe."

Fuller described (*Trans. Ent. Soc. London*, p. 45, 1899) a variety of this species under the name of *L. frenchi*, var. *macrozamiæ*, from Western Australia, upon *Macrozamia frazeri*.

Lecanium hemisphæricum, Targioni-Tozzetti (Fig. 18.)

Studii sule Coccinglie, pp. 26, 39, 63, p. 63, 1867; *Cat. Coccid.*, p. 38, 1869.
Lecanium coffeæ, Signoret, *Ann. Soc. Ent. France* (5), vol. iii, p. 435. 1873.
Comstock, *U.S. Dep. Agr. Report*, p. 344, 1880.
Newstead, *Mon. Brit. Coccidæ*, vol. ii, p. 114. 1903.

A cosmopolitan introduced scale, originally described from Europe, and recorded from New Zealand upon Camellia in 1884, and from Australia ten years later upon hothouse plants in South Australia. It probably has a wide distribution, as I have recently had specimens from Darwin (Northern Territory), from Mr. G. F. Hill, upon an undetermined weed. In Europe it is found on many garden shrubs (Oleander, Camellia, &c.), fruit-trees (orange and peach), forest trees (sago palms, cocoanut palm, coffee, &c.).

The adult female varies in colour from light brown, reddish, to almost black; more or less hemispherical in form, ovate or slightly elongate, convex, apparently smooth, but when examined with a lens seen to be thickly studded with yellowish dots. In the immature females the dorsal surface shows parallel and transverse carinæ, which form a distinct H on the back, but this is very indistinct on the adult forms. Length, $\frac{1}{8}$ of an inch. Height, $\frac{1}{12}$ of an inch. Several closely allied forms have been described as distinct species, such as *Lecanium hibernaculatum* and *L. clypeatum*, which are not considered synonyms of *L. hemisphæricum*.

993. *Saissetia hemisphærica*. Cat. Coccidæ, p. 202.

Lecanium hesperidum, Linnæus.

Coccus hesperidum, *Syst. Nat.*, edition x, vol. i, p. 455. 1758.
Burmeister, *Handb. Entomology*, vol. xi, p. 69. 1835.
Maskell, *Coccidæ of N. Zealand*, p. 80. 1887.
Newstead, *Mon. Brit. Coccidæ*, vol. ii, p. 78. 1903.

One of the first described, and most widely distributed species, commonly known as the "Soft Scale" of the orange, but found upon many cultivated plants and even native shrubs.

Female coccids when immature are greenish yellow, soft and flattened, only slightly convex, and often half curled round the young branchlets, or flattened down on either side of the mid-rib of the leaves.

Adult female dull orange to yellowish brown, with darker markings and spots all over the central portion of the derm. Length, $\frac{1}{8}$ of an inch. In the adult form, swollen and rounded in the centre, elongate, narrowed behind, often with one side of the cephalic portion curved to one side.

A great deal has been written about this species. There is a list of 88 references to it in Mrs. Fernald's catalogue. Douglas (*Entomologists' Monthly Magazine*, 1887) describes the male coccid. Maskell and Douglas have written regarding the affinities of *Lecanium hesperidum* and *L. lauri*, but the latter is now considered only a variety of the former. Another variety, *L. hesperidum* var. *pacificum*, has been described from the Galapagos Islands.

848. *Coccus hesperidum*. Cat. Coccidæ, p. 168.

Lecanium levis, Maskell.

Trans. N. Zealand Institute, vol. xxviii, p. 392. 1896.
Akermes levis, Cockerell, *Ann. and Mag. Nat. Hist.*, vol. ix, p. 453. 1902.

Found upon the branchlets of *Acacia longifolia* and several other species of wattles, in the neighbourhood of Sydney, New South Wales. Allied to *Lecanium scrobiculatum*.

The adult female is convex, also flanged on sides and front; dorsum convex, rounded, rising up from the outward flange. Bright, shining, usually dull yellow to brownish, clouded with dull red patches, with many small pits, but without any circular tubercules. Length, $\frac{1}{12}$ inch.

Cleared in oil, specimens are dark reddish-brown, finely tessellated with darker lines, and central part blackish, with a short reddish stripe on either side containing pale yellow spots.

Cockerell placed this species and *L. scrobiculatum* in the genus *Akermes* with some South American coccids, "distinguished by their globular form round chitonous areas on the skin, and microscopical tessellation of the larvæ."

893. *Akermes levis*. Cat. Coccidæ, p. 178.

Lecanium longulum, Douglas (Fig. 27).

Ent. Monthly Magazine, vol. xxiv, p. 97. 1887.
Lecanium chirimoliæ, Mask., *Trans. N. Zealand Inst.*, vol. xxii, p. 137, pl. iv, figs. 5–15. 1889.
Lecanium longulum, Newstead. *Mon. British Coccidæ*, vol. ii, p. 86, pl. 4, figs 11–14. 1902.
Calymnatus longulum, Cockerell, *The Industrialist*, p. 229. April, 1899.

This is a more or less tropical species, supposed to be a native of the West Indies, and spread chiefly with hothouse plants and on tropical fruits. It is not recorded from Australia in Mrs. Fernald's catalogue, but I have specimens upon custard apple (*Anona reticulata*), sent from Darwin (Northern Territory) by Mr. G. F. Hill.

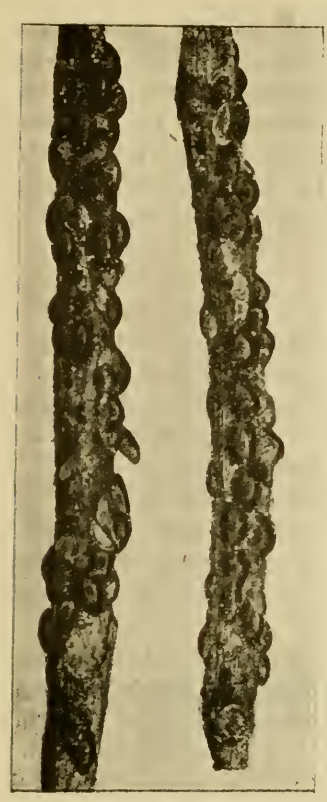

Fig. 26. *Lecanium berberidis.*

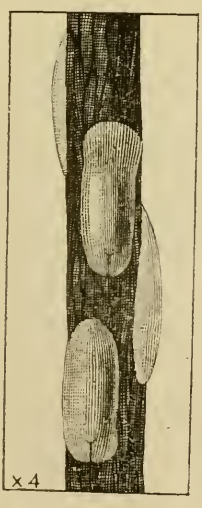

Fig. 27.—*Lecanium longulum.*

Fig. 28. *Lecanium pattersoniæ.*

Adult female yellowish brown, smooth, shining, elongate, much longer than broad, rounded at the extremities, convex. On some plants this species becomes much broader, and resembles *L. hesperidum* in general form, but typical specimens are long, slender, and semi-cylindrical. It can be distinguished from the former by the long stout eight-jointed antennæ, and the derm cells being nearly twice as numerous. In *L. hesperidum* the antennæ are seven-jointed. Length, $\frac{1}{6}$ inch. Maskell described his species from Fiji upon the same food-plant (custard apple).

850. *Coccus longulus.* Cat. Coccidæ, p. 171.

Lecanium melaleucæ, Maskell (Fig. 19).

Trans. N. Zealand Institute, vol. xxx, p. 239, pl. xxvi, figs. 3–8. 1898.
King, *Canadian Entomologist*, 1902, p. 60.

This fine species was collected upon ti-tree (*Melaleuca* sp.) bushes growing on Palmer Island, Clarence River, New South Wales.

In a list of the coccidæ of Massachusetts, King lists this species as one introduced into the United States upon *Monstera deliciosa*, growing in a hothouse at Harvard University. If his identification is correct, it is a most remarkable instance of a rare Australian coccid (only recorded from the one locality) being introduced on a hothouse plant.

The adult female is reddish brown, slightly convex, tapering behind, without distinct dorsal carinæ; epidermis, slightly rough, with minute pustules; sometimes the dorsal surface is ornamented with white, waxy tufts. Length, from $\frac{1}{8}$ to $\frac{1}{7}$ inch.

The male puparium forms a thin, glassy test, with the centre covered with additional snow-white, waxy secretion. Length, $\frac{1}{11}$ inch.

1409. *Lepidosaphes melaleucæ.* Cat. Coccidæ, p. 311.

Lecanium mirificum, Maskell.

Trans. N. Zealand Institute, vol. xxix, p. 312, pl. xx, figs. 7–14. 1897.
Saissetia mirifica, Cockerell and Parr., *The Industrialist*, p. 146. 1899.

The type specimens found on the foliage of the "Weeping Myall" (*Acacia pendula*), growing in the Mallee Scrub, North-West Victoria.

Adult female dark brown to yellowish brown, very convex, with a flattened broad margin right round. At the apex of the dorsum there are two rows of rather deep subcircular pits, varying from four to six in number. The abdominal cleft normal, with the dorsal lobes small. Length, up to $\frac{1}{2}$ inch; width, $\frac{1}{3}$ inch; and height, $\frac{1}{4}$ inch. The immature coccids are finely granulated on the dorsal surface, numerous yellow spots showing through the uniform brown coloration.

The large size of the adult female, with the distinctive pits in the centre of the back, and the broad, marginal flange, gives it a very distinctive character.

995. *Saissetia mirifica.* Cat. Coccidæ, p. 204.

Lecanium nigrum, Nietner. (Fig. 20).

Enemies of the Coffee, p. 9. 1861.
Douglas, *Ent. Monthly Magazine*, vol. xxvii, p. 95. 1891.
Green, *Indian Museum Notes*, 1889 and 1896; *Coccidæ Ceylon*, 1896.
Maskell, *The Entomologist*, vol. xxvii, p. 166. 1894.

This is a tropical species found originally upon coffee, but since recorded upon many other Indian plants and shrubs, and introduced into New Zealand and Australia. Maskell considers that *Lecanium depressum* and *L. begoniæ* are identical with this species, and Green follows him, but Mrs. Fernald gives all three specific rank.

It is common in Australia upon our Pittosporum hedges, the dark black oval females covering the leaves.

Adult female elongate oval, very convex, smooth shining, reddish-brown to black in colour. Length, 4 mm.

Treated with oil of cloves, it assumes a rich reddish-brown tint, with the outer irregular flanged basal margin bright yellow; above this margin is a dark brown band, with the whole of the dorsal surface tessellated with distinct irregular-rounded or six-sided spots, giving them a very distinctive character.

996. *Saissetia nigra*. Cat. Coccidæ, p. 204.

Lecanium oleæ, Bernard (Fig. 21).

Chermes oleæ, Mem. d'Hist. Nat. Acad. Marseilles, p. 108. 1782.
Walker, *Brit. Mus. Catalogue*, Homoptera, p. 1070. 1852.
Signoret, *Ann. Soc. Ent. France*, vol. iii, p. 440. 1902.
Newstead, *Mon. Brit. Coccidæ*, vol. ii, p. 126. 1902.

This is the common "Olive Scale" of Europe, which was probably introduced into Australia at a very early date. It is cosmopolitan in its range, and found on many different food-plants. In our orchards it is popularly known as the "Brown Bug."

In the orchard it is chiefly a pest of the citrus trees, spreading over the twigs and foliage, and in badly infested trees, sometimes found upon the stalk and base of the fruit. The adult females discharge a large amount of honey-dew, which, coating the leaves and twigs with a varnish of sugary matter, is again infested with smut or fumagine which blackens and disfigures the whole of the foliage, and can only be removed by spraying.

Adult female almost hemispherical, very convex, or irregularly rounded; dull reddish-brown to almost black; the outer margins irregular, the dorsal surface keeled in typical specimens with two short transverse ridges and a central ridge. Often covered with a slight waxy secretion broken up into white dots. Length, 4 mm.

At the final stage of development she is a thickened leathery sac, shrunken beneath, with the cavity full of eggs or larvæ.

Puparium of male rare, but of the typical lecanid form, "studded with irregular waxy plates." (Green).

998. *Saissetia oleæ*. Cat. Coccidæ. p. 205.

Lecanium pattersoniæ, Maskell (Figs. 22 and 28).

Trans. N. Zealand Institute, vol. xxvii, p. 57. 1894.

This elongate lecanid confines itself to the foliage of *Patersonia glabrata* (a small blue-flowering plant belonging to the Iris family), common on the sandstone country about Sydney.

An infested plant has all the leaves covered with white woolly filaments enveloping the coccids beneath.

The adult female is reddish-brown in the centre, with a broad central clear parallel stripe (carina) with a row of dark spots down each side; the whole finely tessellated with the margins yellow, and lightly covered with a white waxy secretion. General form elongate, boat-shaped, convex, the extremities rounded; two small indentations on either side, from each of which a fine transverse line runs up the side, merging into the dorsal carina. Length, $\frac{1}{5}$ inch. Under-surface very convex, legs and antennæ well developed; the lines from the marginal indentation outlined on the ventral surface with a white secretion. The whole margin fringed with short irregular setæ or hairs.

Male test composed of fine semi-transparent waxy plates, impressed on the sides; of the usual elongate form. Length, $\frac{1}{10}$ inch.

1030. *Lecanium patersoniæ*. Cat. Coccidæ, p. 212.

Lecanium persicæ, Geoffroy.

Chermes persicæ, Histoire abrege des Insectes. 1762.
Coccus persicæ, Fab., *Gen. Ins.*, p. 304. 1776.
Lecanium rosarum, Snellin van Vollenhoven (Maskell, *T. N.Z. Inst.*, p. 22), 1891.
„ *cymbiformis*, Targ., *Catalogue*, p. 37. 1869.
„ *sarothamni*, Douglas *Ent. Month. Mag.*, vol. xxvii, p. 65. 1891.
„ *assimile*, Newstead, *Ent. Month. Mag.*, vol. xxviii, p. 141. 1892.
„ *persicæ*, Newstead, *Monog. British Coccidæ*, vol. ii, p. 89. 1902.

This widely distributed species, originally a native of Europe, is now recorded from the United States, and from Australia, by Maskell, upon gooseberry twigs from Melbourne, Victoria. In Mrs. Fernald's catalogues, its food-plants include the grape vine, peach, mulberry, plum, nectarine, and Japanese quince.

"Adult female dark red to reddish-brown, semi-globular, sometimes elongated; epidermis smooth, showing some minute transverse wrinkles. Diameter, $\frac{1}{16}$ to $\frac{1}{5}$ inch." (Maskell).

Newstead says: "Adult female dusky yellow, dorsal area usually paler, with from eight to nine transverse bands formed of blackish and more or less distinct confluent spots. After parturition, the blackish markings disappear and the colour changes to light reddish-brown or dark castaneous. Form elongate ovate and highly convex or rarely short ovate and almost hemispherical."

954. *Eulecanium persicæ*. Cat. Coccidæ, p. 191.

Lecanium pseudexpansum, Green.

Bulletin of Entomological Research, vol. v, part iii, p. 233. 1914.

This species was sent to Mr. Green from Port Darwin, Northern Territory of Australia (G. F. Hill), upon the foliage of a "Screw palm" (*Pandanus odoratissimus*).

This species is closely allied in colour, structure, form, and size to *Lecanium expansum*, but differs in having simple marginal setæ instead of flabelliform setæ, as in *L. expansum*.

Green, after giving a technical description of this new species, says: "Nor is the resemblance purely superficial, for the structure of the antennæ, the absence of limbs, and the disposition of the pre-anal ceriferous pores are all common in the two species. The male puparium of the two species are indistinguishable."

Lecanium scrobiculatum, Maskell (Figs. 23 and 24).

Trans. N. Zealand Institute, vol. xxv, p. 221, pl. xiii, figs. 5–7, 1892; vol. xxvii, p. 58, 1894; vol. xxviii, p. 391, 1896.

Lecanium pinque, *Trans. N. Zealand Institute*, vol. xxvii, p. 58, 1904; vol. xxviii, p. 391, 1896.

Akermes pinquis, Cockerell, *Ann. Mag. Nat. Hist.*, vol. ix, p. 453. 1902.

A common species upon *Acacia decurrens*, Mittagong (New South Wales), and on *Dillwynia juniperina*, Bankstown (New South Wales). Found in other localities about Sydney, and at Whitton (New South Wales), on *Acacia*, sp.

The type was described from Whitton; the specimens from Bankstown were described under the name of *Lecanium pinque*, but Maskell afterwards considered the differences were more local than specific.

Adult female varying from bright reddish-brown, usually darkest in centre to dull brown, covered with a fine waxy secretion, giving it a shiny varnished appearance, with deep circular pits on the dorsal surface; central radiating blotches and margin pale yellow. Very convex, humped in centre, longer than broad, with the margin forming a distinct flange; the front portion projecting like the toe of a shoe; the dorsum ridged with a row of six stout tubercles, the first separated from the following five, followed by a more irregular row of five on either side, with a row of four yellow pits on either side between the dorsal and lateral tubercules. Length, $\frac{1}{8}$ inch.

Lecanium synapheæ, n.sp.

This fine species comes from Boyanup, Western Australia, and was found by Mr. L. J. Newman, covering the curious serrate foliage of *Synaphea petiolaris*.

Adult female reddish-yellow in the centre with the outer margin pale yellow. Treated with oil of cloves, the pale outer margin shows a ring of irregular brown spots, and the central darker portion shows a tessellated,

pattern of egg-shaped bodies bedded in darker brown. Dorsal surface covered with a white mealy wax-like white bloom, and the outer margin fringed with fine setæ. General form broadly rounded, flattened, or very slightly convex on the dorsal surface, rounded on the margins, but showing two slight indentations on either side from which run up transverse lines meeting the short carina in the centre of dorsum; anal opening and cleft large; ventral surface flattened with four white transverse lines in centre; legs long and slender; rostrum large; antennæ long, slender. Length, $\frac{1}{7}$ inch; diameter, $\frac{1}{5}$ inch.

Male test white, semi-opaque, slightly granulated and mealy; elongate, oval; upper surface smooth, convex, not angulated, with fine white lines traversing the dorsum and joining in a V-shaped point at the anal opening. Length, $\frac{1}{10}$ inch.

This species comes near *Lecanium expansum* in its broad flattened form and lateral constrictions.

Lecanium tessellatum, Signoret (Figs. 25 and 29).

Ann. Soc. Ent. France (5), vol. iii, p. 401. 1873.
Douglass, *Ent. Monthly Magazine*, vol. xxiv, p. 25. 1887.
Cockerell, *Ann. and Mag. Nat. Hist.* (7), vol. ix. p. 453. 1902.

This *Lecanium* has been introduced into Australia on hothouse plants, and is common on palms, ferns, &c. Signoret described the type upon the foliage of a palm (*Caryota ursus*) at Montpellier; Maskell described it on the foliage of *Laurius nobilis*, from Sydney. In the Botanic Gardens, Sydney, it is common on many plants, but is nearly always found upon *Coccoloba platyclada*, a curious flat-leaved plant, native of the Solomon Islands.

The adult female is flat, slightly convex, very irregular in form, but usually broad oval, narrowest in front, and one side more arcuate than the other, which may be almost straight. When alive it has a greenish tint, which fades into a reddish-brown in the centre surrounded with a dull yellow margin. The whole surface is covered with fine reticulations, with the outer margins having two deep indentations on either side, with distinct lines running across to the dorsum, while the whole is distinctly broken with finer transverse lines, so that it looks as if the margin was made up of a number of plates, with a fringe of fine scattered hairs or setæ along the edge. Antennæ and legs well developed. Length, $\frac{1}{5}$ of an inch.

Male tests crystalline white.

837. *Eucalymatus tessellatus*. Cat. Coccidæ, p. 166.

Fig. 30.—*Cryptes baccatum*. (young females)

Fig. 29.—*Lecanium tessellatum*.

Fig. 31.—*Cryptes baccatum*. Adult females and male puparia (white).

Genus XXIII. *Cryptes*, Crawford.

Maskell, *Trans. N. Zealand Institute*, vol. xxiv, p. 21. 1891.
Cockerell, *Canadian Entomologist*, vol. xxxiii, p. 58. 1901.

This generic name was given to this species by Mr. Crawford, of Adelaide, when sending the types to Maskell for description. The latter, however, dropped the name of *Cryptes*, and described it in the genus *Lecanium*, to which it is closely allied. Cockerell, when defining his subdivision of the genus *Lecanium*, defined this genus on the male characters, "Male scale felted, sub-cylindrical, with a glassy operculum." Remarkable changes take place in form and colour of the female during the different stages of her development, from the biscuit pale-brown colour and shoe-like form to the blue coloured berry form, and final thick-set, dark brown, pear-shaped form. If the three distinct forms had been sent without any information as to their affinities to some of our earlier authorities on coccids, I am sure they would have created three species.

Cryptes baccatum, Maskell (Figs. 30 and 31).

Lecanium baccatum, Trans. N. Zealand Institute, vol. xxiv, p. 20, pl. ii, fig. 8–16 1891; vol. xxv, p. 217, 1892; vol. xxix, p. 311, 1899.
Lecanium baccatum, Fuller, *Trans. Ent. Soc. London*, p. 458. 1899.

This fine coccid has a very wide range over Australia on different species of Acacias, having been found at Adelaide (South Australia), on *Acacia armata*, Crawford; Sydney (New South Wales), on *Acacia linearis*, *A. longifolia*, *A. decurrens*, and *A. pendula*, Froggatt; Western Australia, on *Acacia melanoxylon*, and *A. calamifolia*, Fuller. The male and female coccids thickly encrust the infected twigs and branches of these wattles.

Adult female brownish yellow, smooth, shining, broadly rounded to the summit and contracted almost to a stalk with irregular rounded aperture, the roughened corrugated edges attached to the bark giving a general thick-set pear-shaped form. Often very irregular, both in size and form, when thickly massed together on the twigs, as they generally are upon the acacia. Average width, $\frac{1}{3}$ inch, and nearly as high. At this stage simply a thickened leathery or horny bag, with the antennæ, legs, and rostrum aborted on to the inner surface.

The immature female coccids are usually of a shiny slate-blue tint, and are more elongate, oval or berry-shaped in form, with the opening on the hind portion of the back distinct and often when observed, particularly in the early morning, covered with a globule of clear honey-dew. In the earlier

stage the colour is light yellowish-brown, the general form elongate, oval, tapering behind and round on the sides, convex, but flattened on the back, and showing two or more parallel lines of shallow punctures or depressions; the apical orifice large, irregularly rounded, and dark brown towards the front. Maskell says the antennæ are eight-jointed and feet rather slender. In the immature, or earlier stages of development, the coccids rest upon a slight pad of cottony secretion.

The male coccids are enclosed in white sub-cylindrical, closely felted, cottony puparia, the ends of which are closed with a thin glassy plate in which there is a small orifice. Length, about $\frac{1}{11}$ of an inch. These male puparia often cluster along a small twig with their base of attachment surrounded with white cottony secretion, and quite separate from the females.

1099. *Cryptes baccatum.* Cat. Coccidæ, p. 209.

Genus XXIV. *Alcerda*, Signoret.

Ann. Soc. Ent. France, vol. iv, p. 46. 1874.
Newstead, *Mon. British Coccidæ*, vol. ii, p. 10. 1903.

This genus was created by Signoret for a lecanid coccid living underground in Southern Europe on grass. The female has no legs or antennæ, and is covered with a felted ovisac. The larvæ are very elongate, with parallel sides; the margins of the body fringed with fine short bristles. Six species have been described in different parts of the world, and though few in number, the genus has a very wide range over Europe, California, Japan, and Natal.

Alcerda sella-hispanica, Lindenger.

Die Fauna Südwest Australiens, Bund. iv, p. 8. 1913.

The species comes from North Fremantle, Western Australia.

"Adult female brown; broad elliptical, depressed in the centre, with longitudinal carina down the dorsum, margin with few spines, rounded at apex, anal segment broad and tooth-shaped. Antennæ and legs, wanting or aborted. Length, 3 mm., 2 mm. broad, and 1 mm. in height."

Genus XXV. *Lecanopsis*, Targioni-Tozzetti.

Rhizobium, Targ., *Studii sul Cocci*, p. 23. 1867.
Targ., *Catalogue*, p. 36. 1869.
Sign., *Ann. Soc. Ent., France* (5), vol. iv, p. 93. 1874.

The members of this genus are subterranean in their habits, living on the roots of plants like some of the members of the genus *Dactylopius*, but are easily distinguished from members of the latter genus by the lecanid abdominal cleft, in the anal lobes, and in having six-jointed antennæ. The legs are present, but small and usually aborted, mentum monomerous. Four species have been recorded from Europe and North America, and one from Australia. Cockerell removed our species from this genus and created a new genus *Alecanopsis*, making *A. filicum* the type; as far as I can see the reasons given are only colour, and the more convex and rugose form of the adult coccid. The convexity and deeper segmentation of the abdomen seem doubtful generic characters unless a series of specimens have been examined by the creator of the new genus.

Lecanopsis filicum, Maskell.

Proc. Linn. Soc. N. S. Wales, vol. viii (2nd ser.), p. 225, pl. vii, figs. 1–4. 1893.
Cockerell, *Canadian Entomologist*, vol. xxxiii, p. 58. 1901.

The type was found upon the roots of *Doodia aspera* (fern) growing on the Kurrajong, near Richmond New South Wales.

Adult female dark reddish brown, general form turbinate with the undersurface slightly concave, the cephalic portion smallest, smooth, with the rostral plate large and rounded. Antennæ short, rather thick, conical, six-jointed. Feet short, rudimentary, joints swollen. Abdominal portion broadest, rounded at apex, distinctly segmented and very convex; the anal segment rounded on either side, with distinct anal clefts and lobes.

In Maskell's description no measurements are given; my specimen, taken on the roots of the same species of fern near the original locality, is $\frac{1}{2}$ inch in length, and $\frac{3}{10}$ inch across the abdomen, with a height of $\frac{1}{4}$ inch. These measurements do not agree with Malkell's description, as he says "the height being equal to the length."

1021. *Alecanopsis filicum*. Cat. Coccidæ, p. 211

SUB-FAMILY III.—*Dactyloptiinæ.*

The coccids belonging to this group may be defined as scale insects not forming shield-like scales as in the diaspids, or naked like the lecanids, but at the adult stage protected or covered with a waxy, felted, cottony, floury, or woolly coat, usually fitting close over the dorsal surface of the full-grown female, as she shrivels up after egg laying, forming a cavity under which the larvæ are hatched and protected until they emerge. They are active in some cases in their earlier stages of development, but stationary when fully developed. Though some species are popularly known as "mealy bugs," the members of the typical genus *Dactylopius* differ from the true "mealy bugs" (*Monophlebinæ*) in being enveloped in, or resting upon a pad or cushion of woolly filaments instead of producing the woolly ovisac behind their bodies.

The male tests, like those of the lecanids, differ in form and structure from those of the females, being often slipper-shaped, ribbed or corrugated, with the truncated anterior portion adapted for the escape of the perfect male.

The adult females are more or less broadly oval, with or without legs, antennæ usually well developed, but sometimes aborted. The body is slightly segmented with the anal segment furnished with a pair of rounded, small, and not very prominent anal tubercules each bearing a bristle; the anogenital ring usually large and well defined. Cockerell, in his classification, divides the dactylopid coccids into five tribes, places them all in the sub-family *Coccinæ* and makes the *Dactylopiinæ* the last tribe.

In Mrs. Fernald's catalogue the gall-making coccids are placed in this sub-family. From a careful study of our peculiar forms I consider that they are entitled to a distinct division, and am therefore placing them in the sub-families *Brachyscelinæ* and *Idiococcinæ*.

The dactylopid coccids are well represented in Australia by many fine indigenous species peculiar to our flora, and other introduced species. Speaking generally, there are no very serious orchard pests found in this division in Australia, though some of our native plants and shrubs are sometimes badly infested, especially when the shrubs are grown under cultivation. Introduced with young trees into New Zealand *Eriococcus coriaceous*, without its natural parasites in Australia, did serious damage in their plantations.

The following genera are represented in Australia :— Genus XXVII *Asterolecanium*, XXVIII *Lecaniodaspis*, XXIX *Cerococcus*, XXX *Kermes*, XXXI *Rhizococcus*, XXXII *Gossyparia*, XXXIII *Eriococcus*, XXXIV *Pseudoripersia*, XXXV *Erium*, XXXVI *Dactylopius*, XXXVII *Pseudococcus*, XXXVIII *Ourococcus*, XXXIX *Epicoccus*, XL *Lachnodius*, XLI *Ripersia*, XLII *Antonina*.

Genus XXVII. *Asterolecanium*, Targioni-Tozzetti.

Introduction 2nd Mem. Studi. Cocc., Catalogue, p. 41. 1869.
Planchonia, Signoret, *Ann. Soc. Ent., France* (4), vol. x, p. 282. 1879.
Asterodaspis, Signoret, *Bull. Soc. Ent., France* (5), vol. vi, p. 209. 1876.
Green, *Coccidæ of Ceylon*, part iv, p. 311. 1909.
Newstead, *Mon. British Coccidæ*, vol. ii, p. 150. 1902.

The female coccid is completely enclosed in a box or sack-like structure (sometimes embedded in the soft tissue of the leaf or stem, with the top level with the surface of the bark), composed of opaque, semi-transparent, glass like, waxy or horny secretion, with the outer margins fringed with crystalline filaments or waxy spines. At the anal extremity there is a small opening, through which the young larvæ escape from the sac.

The enclosed adult coccids are legless, with antennæ wanting or else much aborted. The anal lobes are small and rudimentary, with the margins of the integument fringed with one or two rows of curled glands.

Maskell included all the species now placed under this genus in Signoret's genus *Planchonia*, and was very critical about other writers on coccids not adopting it, but as this name *Planchonia* had been previously used in zoology it had to be discarded.

Members of this genus are widely distributed, about twenty-six species have been described; but as several workers have relied chiefly upon size and colour without indicating the structural differences, several may have to be struck out.

Asterolecanium fimbriatum, Fonscolombe (Fig. 33).

Coccus fimbriatus, Ann. Soc. Ent., France, vol. iii, p. 209. 1834.
Planchonia fimbriata, Signoret, *Ann. Soc. Ent., France* (4), vol. x, p. 515. 1868.
" Maskell, *Trans. N. Zealand Institute*, vol. xxvi, p. 85. 1893.

This species is recorded from Europe and British Guiana, but Maskell has also identified it with the species he had sent to him from Queensland on

Fig. 32.— *Lichtensia hakearum.*

Fig. 33.—*Asterolecanium fimbriatum.*

Leptospermum flavescens. From Maskell's subsequent remarks he appears to think that our common species, which he called *Planchonia styphelicæ*, was identical or only a variety of the European species.

The adult female forms the typical yellow waxy test with the margins lighter; she has no legs or antennæ.

176. *Asterolecanium fimbriatum.* Cat. Coccidæ, p. 50.

Asterolecanium hakeæ, Fuller.

Planchonia hakeæ, Journal Bureau Agriculture, W.A., p. 1354. 1897.
Asterolecanium hakeæ, Trans. Ent. Soc., London, p. 456. 1899.

This species was found on the foliage of *Hakea ilicifolia* and an undetermined species of *Acacia* near Perth, W.A.

Female test, light green, semi-transparent, flat, circular, no fringe. Diameter 0·06. Adult female margined with a fringe of figure-of-eight spinnerets, which are sometimes double. A single row of multicircular pores round the margin. Fuller, in his first notice, stated that this species was allied to *Planchonia ventruosa*, but in the second definition said it was allied to *A. quercicola.*

178. *Asterolecanium hakeæ.* Cat. Coccidæ, p. 51.

Asterolecanium miliaris, Boisduval.

Insectol. Agricole, 1869.
Signoret, *Ann. Soc. Ent., France* (4), vol. x, p. 281. 1870.
Green, *Coccidæ of Ceylon*, pt. iv, p. 338, pl. cxxix, figs. 1–4. 1904

This species is common upon the foliage and stems of the giant bamboos. It has been recorded from Algeria, Mauritius, Brazil, Jamiaca, Trinidad, and Ceylon. I found it all over the bamboos in the Botanic Gardens at Brisbane, Queensland. A second species with a very similar range (*A. bambusæ*) is also found on the bamboo, but is of a greener tint and much more circular in the form of the test; both are figured and described in Green's *Coc idæ of Ceylon.* He says that in Ceylon this species is found upon the stem, and not on the foliage, but in the Kew Botanic Gardens says it is on the leaves.

Test of female dull yellow, semi-transparent, with the enclosed reddish-brown female darkening the anterior portion, elongate oval, constricted and tapering to the posterior portion, fringed on margin; dorsal surface very convex with central carina, and slight transverse lines. Length about $\frac{1}{20}$ of an inch.

Adult female reddish yellow, tip of abdomen semi-transparent, with the anal lobes each furnished with a long seta, with spines on the lobes and between them. Anal ring with six hairs; marginal pores well defined.

182. *Asterolecanium miliaris.* Cat. Coccidæ, p. 51.

Asterolecanium petrophilæ, Fuller.

Trans. Ent. Soc., London, p. 456. 1899.

This scale was found upon the foliage of *Petrophila linearis* growing on the banks of the Swan River, Western Australia.

The female test is yellowish green, with a white fringe, flat, circular, but sometimes slightly elongated. Length 0·04 inch. This semi-transparent test has a blackish tint from the enc'osed female and looks something like the test of an Aleuroyd.

"Adult female with antennæ aborted, mentum monomerous, margin with a single row of figure-of-eight spinnerets and a row or simple pores."

184. *Asterolecanium petrophilæ*. Cat. Coccidæ, p. 52.

Asterolecanium quercicola, Bouché (Fig. 34).

Lecanium quercicola, Stett. Ent. Zeil., vol. xii, p. 112. 1851.
Asterolecanium quercicola, Signoret, *Anns. Soc. Ent., France* (4), vol. x, p. 279. 1870.
Asterodiaspis quercicola, Signoret, *Anns. Soc. Ent., France* (5), vol. vi, p. 606. 1876.
Asterolecanium quercicola, Maskell, *The Entomologist*, p. 93. 1894.
Planchonia quercicola, Maskell, *Trans. N. Zealand Institute*, vol. xxxviii, p. 396. 1896.

This is the common cosmopolitan oak scale of Europe, which is also recorded from North America, the West Indies, and Mauritius. About 1895 it was found in Nelson, New Zealand, upon the oaks, and in the following year Fuller reported it upon many of the oaks in Hyde Park and the Botanic Gardens, Sydney.

The adult females form their circular glassy yellow tests at the extreme tip of the twigs, half buried in the bark, with the upper surface convex, and irregularly rounded. Diameter about $\frac{1}{16}$ of an inch.

When the tips of the oak twigs are badly infested, the three or four terminal leaves turn brown and die, and every twig may be sometimes infested in this manner, but otherwise its presence does not seem to affect the health of the tree.

186. *Asterolecanium quercicola*. Cat. Coccidæ, p. 53.

Asterolecanium stypheliæ, Maskell (Fig. 35).

Planchonia stypheliæ, Trans. N. Zealand Institute, vol. xxiv, p. 24. 1891.
Planchonia stypheliæ and *P. fimbriata, Trans. N. Zealand Institute*, vol. xxvi, p. 85, 1893; and vol. xxvii, p. 62, 1894.
Fuller, *Trans. Ent. Soc., London*, p. 457. 1899.

This is the common native species with a very wide range over Australia and Tasmania, and though described on *Styphelia richei* and *Leptospermum* bushes, infests many other native shrubs and plants.

Fig. 34.—*Asterolecanium quercicola*

Fig. 35.—*Asterolecanium stypheliæ.*

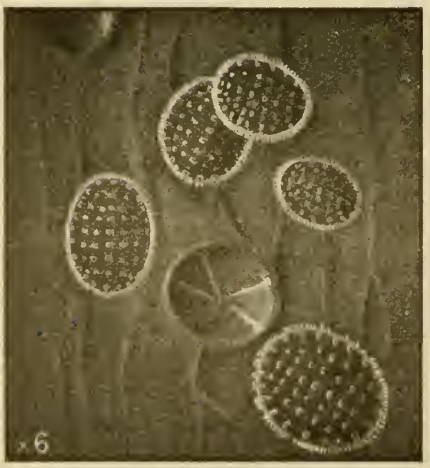

Fig. 36.—*Asterolecanium ventruosum.*

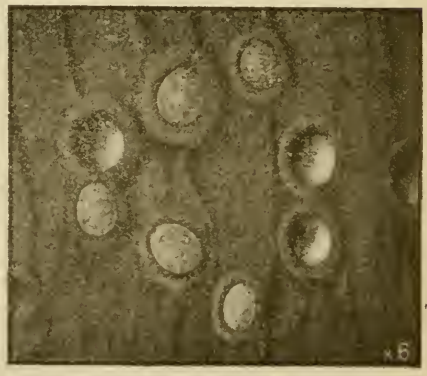

Fig 37.—*Asterolecanium ventruosum.* Small Variety.

The female tests are always found upon the foliage; they are broadly oval, sometimes slightly narrowed behind, convex, and resting upon the surface of the leaf without forming more than a slight depression; general colour greenish yellow, with the darker insect beneath, giving the anterior portion a brownish tint. The outer margin is beautifully fringed with an unbroken band (in fresh specimens) of fine white glassy spines. Length, $\frac{1}{16}$ of an inch.

From the wide range of this species, and the fact that its host plants are all Australian, I do not think that it is identical with the European species, *A. fimbriatum*.

188. *Asterolecanium stypheliæ*. Cat. Coccidæ, p. 53.

Asterolecanium ventruosum, Maskell (Figs. 36 and 37).

Planchonia ventruosa, *Trans. N. Zealand Institute*, vol. xxvii, p. 63, pl. vi, figs. 5–11. 1894.

This species is found upon the twigs of *Acacia liniaris*, growing in the vicinity of Sydney, New South Wales, *Acacia decurrens*, Emerald, Victoria (Mr. C. French, jun.), *Acacia* sp. (Mr. A. Molineaux), South Australia.

The female test is broadly elliptical, flattened, or only slightly convex, more or less impressed into the surface of the bark, formed of a greenish semi-transparent waxy secretion, with the marginal fringe pink or white. Diameter $\frac{1}{20}$ of an inch.

Adult female dark, dull red, sub-circular or only tapering slightly behind; the upper surface flattened or only slightly convex, with the under surface convex and wrinkled. Antennæ and feet absent, but the former indicated by a pair of small tubercules, with the usual figure-of-eight spinnerets. Length, $\frac{1}{20}$ of an inch.

The male test greenish white, glassy, elongated-elliptical, convex

193. *Asterolecanium ventruosum*. Cat. Coccidæ, p. 54.

Genus XXVIII. *Lecaniodaspis*, Targioni-Tozzetti.

Bull. Soc. Ent. Ital., vol. i, p. 261. 1869.

Prosopophora, Douglas, *Ent. Monthly Magazine*, vol. xxviii, p. 261. 1892.

„ Maskell, *Ent. Monthly Magazine*, vol. xxix, p. 105. 1893.

This contains the Australian species which Maskell described under the generic name of *Prosopophora*, and are now included in the above group. Maskell, when defining his species from Australia, somewhat modified Douglas's genus to make them fit into *Prosopophora*.

The members of this genus are closely allied to the *Asterolecanium* in the form and structure of the female tests, but the delicate fringe of glossy filaments is absent round the margins. In the adult female the antennæ, not more than eight-jointed, are well developed; anal tubercules small; anogenital ring with more than eight hairs; legs aborted; mentum monomerous, and in most species a terminal orifice in the enveloping test.

The species is chiefly confined to America and Australia; out of the twenty-three species known ten are described from Australia.

Lecaniodaspis acaciæ, Maskell (Fig. 38).

Prosopophora acaciæ, Trans. N. Zealand Institute, vol. xxv, p. 225, pl. 14, figs. 1–7, 1892.

Prosopophora acaciæ, Fuller, *Trans. Ent. Soc., London*, p. 455. 1899.

The type specimens came from South Australia on the twigs of *Acacia calamifolia*, but it has a very wide range over Australia, and has been found on a number of different species of *Acacia*.

The female test is yellowish brown, waxy, smooth, opaque, slightly convex, irregularly rounded, often with the ventral portion embedded in the bark of the twig; with a small anal orifice at the apex. Length $\frac{1}{7}$ of an inch.

The adult female is of a brown colour and fills the test; the antennæ are short, thick, and apparently composed of four joints, terminal one with a few hairs; feet aborted; anal tubercules bearing two or three spiny hairs; the epidermis with many spinnerets and figure-of-eight orifices.

The male test is white to pale yellow, rugose, waxy, oval, flattened somewhat, impressed with a median ridge and a row of short transverse lines on either side; the apex flattened or truncate with a rounded flap or lid of looser texture than the main portion. Length $\frac{1}{20}$ of an inch. The female tests are often half buried in the tissue of the bark, aborting the infested twig and forming regular pits all over it.

195. *Lecaniodaspis acaciæ*. Cat. Coccidæ, p. 54.

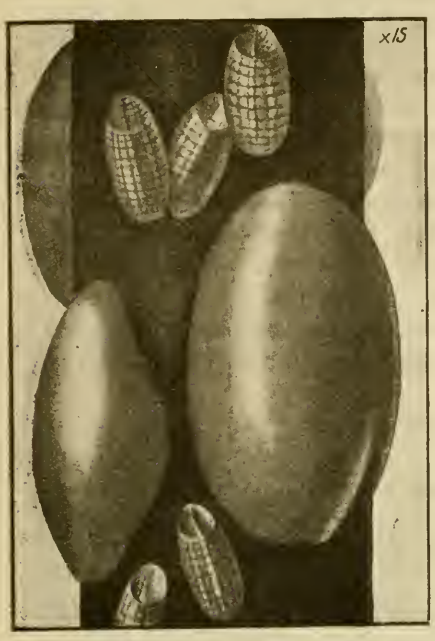

Fig. 38.—*Lecaniodaspis acaciæ.*

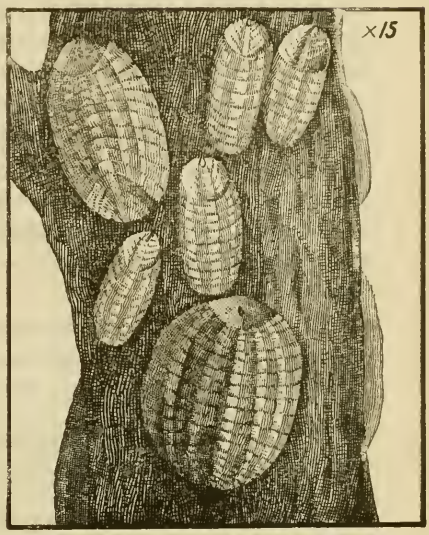

Fig. 39.—*Lecaniodaspis atherospermæ.*

Fig. 40.—*Lecaniodaspis convexus.*

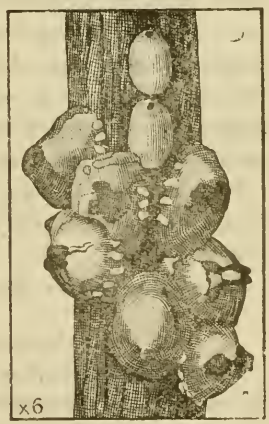

Fig. 41.—*Lecaniodaspis microcribraria.*

Lecaniodaspis anomala, Green.

Birchippia anomala, *Anns. and Mag. Nat. History*, vol. vi, p. 541. 1900.
„ Green, *Ent. Monthly Maagzine*, vol. xxxvii, p. 294. 1901.

This species was made the type of a new genus upon specimens found on an undetermined leguminous plant at Birchip, Victoria. Though Green points out in his " Note on the Genus *Lecaniodaspis* " that this generic name cannot stand, it has generic rank in Mrs. Fernald's catalogue.

The test of the adult female is corneous, semi-transparent, fulvous, formed of brownish waxy secretion, through which the enclosed female can be seen at the anterior portion; broadly oval or oblong, very convex, with numerous transverse and four longitudinal furrows. Length, 1·25.

The adult female is subcircular, joints of antennæ indistinct, usually three, second longest; vertical orifice with many spinnerets; anal ring with then flattened hairs.

The male tests are white opaque, rather broadly oval, with a circular opening at the posterior extremity.

229. *Birchippia anomala*. Cat. Coccidæ, p. 59.

Lecaniodaspis atherospermæ, Maskell (Fig. 39).

Prosopophora atherospermæ, *Trans. N. Zealand Institute*, vol. xxviii, p. 395, pl. xxi. figs. 1–8. 1896.

This coccid is found on the surface of the bark of the branches and trunk of the Sassafras (*Atherosperma moschata*), growing near Fernshaw, Victoria.

The adult female forms thick waxy tests on the bark which are not embedded in pits; convex, longer than broad, having a prominent dorsal ridge with distinct transverse striations. The general colour is a dull reddish brown. Length about $\frac{1}{10}$ of an inch.

The adult female is dull red, fitting close into the test; general form elliptical, dorsal surface convex; antennæ long, composed of eight uniform segments; third longest, terminal one with hairs; feet wanting, anal segment produced into a pair of tubercules with a bristle; margin of the body with two small depressions containing spines. Epidermis covered with tubular spinnerets springing from figure-of-eight orifices. Anal ring distinct, with about ten stout hairs, surrounded with the anal plates.

The male test is waxy, dark yellow, cylindrical, corrugated transversely, with a flat plate on the anterior portion, through which the male emerges. Length, $\frac{1}{20}$ of an inch.

196. *Lecaniodaspis atherospermæ*. Cat. Coccidæ, p. 54.

Lecaniodaspis convexus, n.sp. (Fig. 40).

The female coccids massed together on the branchlets of an undetermined species of eucalyptus growing at Picton, New South Wales. The specimens were determined for me by Mr. E. E. Green.

The test of female is a dull chocolate brown, but the surface is crossed with very fine lines of white secretion in no regular pattern, except that there is usually one forming a dorsal stripe, thin and paper-like but melting in caustic

potash, very convex, longer than broad, often slightly depressed behind; the margins tucked well under the body, but the ventral centre open. Length, $\frac{1}{16}$ of an inch.

The male test is a pale dull yellow, elongate oval, the dorsal surface with a fine dorsal carina, but the whole test finely ribbed with transverse ridges; anal portions arcuate. Length $\frac{1}{16}$ of an inch.

Adult female before egg-laying evidently filling the test, much shrivelled afterwards, reddish brown; very convex beneath, with the derm thickened, covered with many fine indistinct figure-of-eight pores; broadly oval, no legs; antennæ eight-jointed tapering to the tip, first three joints uniform; 4th shorter, 5th and 6th longer, 7th short, terminal one irregularly rounded anal segment lobed on either side, with the anal plate almost enclosing the anal ring, which is encircled with a fringe of about twelve long slender hairs.

Lecaniodaspis dilatata, n.sp.

The tests are formed singly on a slender twig of *Acacia discolor*, and the action of the female coccid causes not only a shallow depression to form as in the bark, but the twigs swell out and thicken wherever the coccid locates itself. It is a rare species, but Mr. T. McCarthy (Assistant to Entomologist, Department of Agriculture), collected several specimens on the wattles at National Park, near Sydney, New South Wales.

The adult female forms a slightly convex, flattened, shield-shaped, light brown, granulated, waxy test, longer than broad, the sides irregularly parallel with the extremities rounded; the anal aperture oval, close to the anterior margin, with the test thickened and reddish brown round the opening. Length, $\frac{1}{5}$ of an inch.

The adult female is a dark reddish brown, convex on the dorsal surface, with the hind segment deeply arcuate, showing two tufts in the centre (in potash these melt away). Length, $\frac{1}{8}$ of an inch. In potash, broadly oval with anal cleft moderate, the whole surface covered with scattered slender spinnerets and pores. Antennæ six-jointed, short, thickened, 3rd joint longest, terminal one small irregular, tufted with two long hairs and a number of shorter ones; feet aborted; anal plates broad chitonous, anal ring with apparently ten hairs.

Lecaniodaspis eucalypti, Maskell.

Prosopophora eucalypti, *Trans. N. Zealand Institute*, vol. xxv, p. 226, pl. xiv, figs. 8–11. 1892.

Prosopophora eucalypti, *Ent. Monthly Magazine*, vol. xxix, p. 105. 1893.

The type specimens were found upon the bark of an undetermined species of Eucalyptus at the western township of Whitton, New South Wales.

The adult female forms a felted yellowish-brown waxy test, rather compact, flattened, sub-circular, and resting in a depression on the bark, with a small orifice in the posterior region. Diameter, $\frac{1}{13}$ inch.

The adult female is brownish red, antennæ rather long, composed of six joints, but appear to be eight through transverse marks across the third and sixth; feet wanting; anal tubercules small; great numbers of tubular spinnerets and figure-of-eight orifices on the epidermis.

The test of the male is white, grey or yellowish, waxy, smooth on the anterior portion, transversely corrugated on the hind portion. Length, about $\frac{1}{25}$ of an inch.

199. *Lecaniodaspis eucalypti*. Cat. Coccidæ, p. 55.

Lecaniodaspis frenchi, n.sp. (Fig. 42).

This remarkable scale comes from the mallee scrub-country in north-west Victoria, where it was obtained by Mr. C. French, jun., covering the branchlets of one of the stunted mallee eucalyptus. The specimens were determined by Mr. E. E. Green.

Fig. 42.—*Lecaniodaspis frenchi*.

The female tests cover the bark in contact with each other, slightly over $\frac{1}{5}$ of an inch in length, pale yellow or light biscuit brown showing a mottled granulated surface, waxy, convex, irregularly rounded, slightly longer than broad, with the hind portion broadest and the margins turned in underneath, a large oval anal aperture well above the margin.

The adult female is a dark reddish brown, much shrivelled after egg-laying, rounded, concave beneath; anal segment arcuate; antennæ tapering, eight-jointed, 1st to 3rd uniform, 4th to 7th smaller, 8th small and irregular, show aborted fore and mid legs, anal ring and anal plate bright yellow, with a fringe of twelve or more hairs.

Lecaniodaspis melaleucæ, Fuller.

Prosopophora melaleucæ, *Journal of the Dep'. of Agriculture, West Australia*, p. 1345. 1897.

Prosopophora melaleucæ, *Trans. Ent. Soc., London*, p. 455, pl. xv, fig. 31. 1899.

A species described from specimens found on the branches of a ti-tree (*Melaleuca leucadendron*), Swan River, Western Australia.

The adult female is enclosed in an ovate papery test, of a greyish colour, under-surface yellow, having a slight dorsal ridge and several transverse impressions, a decided keel round the margin of the whole test at the junction of the two halves. Length, 0·17 inch; width, 0·12 inch.

The adult female is a dark brown tinged with yellow; cylindrical antennæ composed of ten joints; feet aborted, anal lobes striated, without spines or setæ; anal ring with ten short hairs; a few short spines on margin of body and many figure-of-eight orifices.

201. *Lecaniodaspis melaleucæ*. Cat. Coccidæ, p. 55.

Lecaniodaspis microcibraria, n.sp. (Fig. 41).

A scale recorded by Mr. C. French, jun., as very abundant on the branchlets of a small native shrub (*Epacris impressa*), growing on the Dandenong Ranges, Victoria. In a note sent he informs me that in many places on the ranges it is killing out this shrub. This species has been examined and determined under this name by Mr. E. E. Green.

The female test is a greyish brown, broadly oval, very convex, constricted along the margin, with a parallel dorsal ridge, slightly impressed with shallow transverse lines, giving the whole test a roughened surface; anal orifice small and rounded. Length, $\frac{1}{8}$ of an inch.

The adult female is broadly rounded, yellowish brown, with an opaque epidermis that is very finely shagreened with immense numbers of small pores (in one prepared specimen a number of irregularly scattered dark yellow spots stand out): anal plates like the calyx of a flower, with the anal ring at the base with apparently ten flattened hairs pointing upwards; anal segment divided and rounded on either side; antennæ short, composed of eight cylindrical joints tapering to the extremity, second longest, terminal one irregular at tip; feet aborted. Length, $\frac{1}{10}$ of an inch.

Lecaniodaspis newmani, n.sp.

Specimens received from Mr. L. J. Newman, found upon the branches of an undetermined species of *Eucalyptus*, near Perth, Western Australia.

The female test is massed together on the bark like those of *Lecaniodaspis frenchi*, which in general appearance they somewhat resemble. Thin, waxy, of a duller yellowish brown without any paler granulations; broadly irregularly rounded, very convex, with the anal extremity produced into a distinct funnel surrounding the small anal orifice. Length, $\frac{1}{7}$ of an inch.

The adult female is dull brown, oval, with stout cylindrical 7-jointed antennæ, 1st to 4th uniform, 5th shorter, 6th short, 7th short irregular, with scattered bristles at tip. Legs wanting, showing only aborted claws representing the fore legs; anal ring granulated with eight long bristles, the chitinous plates well defined on both sides showing stout pines. Epidermis covered with tubular spinnererts. Length, $\frac{1}{10}$ of an inch.

Genus XXIX. *Cerococcus*, Comstock.

Report United States Dep. Agriculture, p. 213. 1882.
Solenophora, Maskell, *Trans. N. Zealand Institute*, p. 139. 1889.
Solenococcus, Cockerell, *Check List, supp.*, p. 392. Note, 1899.
Solenococcus, Cockerell, *Canadian Entomologist*, vol. xxxi, p. 276. 1899.
Antecerococcus, Green, *Pro. Linn. Soc. N. S. Wales*, p. 560. 1900.
Cerococcus, Comstock, *Report U.S. Dep. Agriculture*, p. 213. 1882.
Cerococcus, Scott, *Trans. Linn. Soc., London*, vol. ix, p. 445. 1907.
Cerococcus, Green, *Coccidæ of Ceylon*, part iv, p. 305. 1909.

The female coccids of this genus form curious waxy tests, sometimes covered with tufts and spiny projections of secretion, produced at the anal extremity into a short tube surrounding the apical opening.

Green says: "Adult female insect with the terminal abdominal segments usually abruptly narrowed. The extremity with two stout spiniferous lobes, each bearing a longish seta; the interno-ventral aspect of the lobes more densely chitinous; a prominent median triangular plate on the dorsal aspect; anal ring with eight stout hairs; antennæ rudimentary. Limbs rudimentary or absent. Mentum dimerous. Derm with conspicuous paired (8-shaped) glands. Cribiform plates present in the dorsal surface of the abdomen. No stigmatic spines.

Male puparium with a large oval or circular operculum above the posterior extremity."

This is a small genus, the members of which are described from California, Mexico, India, Ceylon, New Zealand, and Australia. In Mrs. Fernald's catalogue four species are listed, but with the addition of Green's species from Ceylon and the new ones here described from Australia, the members of the genus are more than doubled.

Cerococcus auranticus, n.sp. (Fig. 43).

This beautiful species was originally discovered by me at Bando Station, near Gunnedah, New South Wales, upon the twigs of the native blackthorn (*Busaria spinosa*); since then they have been found at Lakemba, near Sydney, on the same shrub. This coccid was determined by Mr. E. E. Green.

Test of adult female formed of a stout coat of reddish orange waxy secretion with the funnel-shaped apical tube, spots on surface, and four spine-like tufts pale yellow. General form broadly oval, tapering on the hind margin, where it is produced into a circular tube round the anal opening. Length, $\frac{1}{10}$ of an inch.

Male tests scattered about among the female tests, pale, bright yellow, mottled with red, elongate, rounded in front, cylindrical or slipper-shaped, with the hind portion truncated, with a pale yellow flap. Length, $\frac{1}{20}$ of an inch.

Fig. 43.—*Cerococcus auranticus.*

Fig. 44. *Cerococcus bryoides.*

Fig. 45.—*Cerococcus punctiferus.* Male tests.

Fig. 46.—*Rhizococcus lecanioides.*

Adult female dark reddish-brown, broadly oval, with the anal segment divided, either side produced into a stout blunt lobe bearing one very long hair and several shorter ones. The anal ring with eight or more flattened hairs and the dark chitinous anal plate below forming a half circle almost enclosing it. Antennæ aborted into two blunt horns; legs wanting, epidermis thickly covered with both large yellowish, and smaller semi-transparent, figure-of-eight processes, and many other small circular pores or glands. Length, $\frac{1}{10}$ of an inch.

Cerococcus bryoides, Maskell (Fig. 44).

Planchonia bryoides, Trans. N. Zealand, Institute, vol. xxvi, p. 84 1893; and vol. xxix, p. 315, 1897.

Asterolecanium bryoides, Cockerell, *Bull. Illinois State Laboratory*, vol. iv. 1896.

This species was described from specimens upon the bark of an undetermined plant received by Maskell from Fiji. Later on he received specimens from New South Wales upon the twigs of the native cherry (*Exocarpus cupressiformis*), which he described under the varietal name of *stellata*, but did not seem to consider it even a well-defined variety. I have found it upon the stems of a plant *Helichrysum diosmifolium* at Mittagong, New South Wales. Mr. C. T. Musson obtained it at Richmond (Hawkesbury College) upon broom.

Test of adult female formed of dull yellowish secretion, but so thickly covered with secretionary matter forming grey tufted filaments that it gives it a greyish-brown tint; irregularly oval, convex, with a large anal opening on the hind margin. Length, $\frac{1}{10}$ of an inch.

Male test pale yellow, semi-transparent, sometimes with a greyish tint, finely granulated, elongate oval, slipper-shaped, round in front, with the hind portion truncate. Length about $\frac{1}{8}$ of an inch.

Adult female dull yellow, broadly oval, with the anal segment elongated, rounded to apex, slightly cleft, with the anal lobes bearing a long bristle or seta. Maskell calls the anal segment a short conical "tail," and the whole female of a peg-top shape. The anal ring and anal plate dull yellow, chitinous, former bearing short hairs. Derm thickly covered with figure-of-eight orifices, of two sizes. Legs and antennæ wanting. Length, $\frac{1}{8}$ of an inch.

218. *Antecerococcus bryoides*. Cat. Coccidæ, p. 58.

Cerococcus punctiferus, Green (Fig. 45).

Antecerococcus punctiferus, Pro. Linn. Soc. N. S. Wales, p. 560, vol. xxv, pl. xxxiii, figs. 3–9. 1900.

This species was described from specimens obtained at Bathurst, New South Wales, upon the stems of a garden shrub, *Pittosporum eugenioides*.

In January, 1903, I visited and fumigated a pittosporum hedge in a garden at Nowra, New South Wales, that was very badly damaged by this coccid, every twig being so thickly encrusted with the tests that one could hardly define the individual specimens. The female tests in these examples were much more thickly covered with the glassy white filaments than the typical forms.

Adult female enclosed in a stout covering of granulated waxy secretion of reddish colour, with four tufts of pale glassy white filaments, two large ones on each side, with smaller tufts behind. Broadly rounded with the hind portion tapering round the anal opening.

Male tests slipper-shaped, of a more yellow tint, mottled with pale red, front rounded, the hind portion truncate, sloping downward. Length, 1·25 mm.

Adult female irregularly oval (treated in potash, pyriform), the abdomen terminating in a pair of conical lobes each furnished with a long seta and several smaller spines on the sides; anal ring with eight stout flattened hairs. Antennæ and legs rudimentary. Derm covered with figure-of-eight pores, of two sizes, the larger ones grouped in definite spots, also bands of small circular pores. Length, 1·25 to 1·50 mm.; breadth (across thorax), 1 mm.

219. *Antecerococcus punctiferus*. Cat. Coccidæ, p. 58.

Cerococcus pyriformis, n.sp.

The female tests were thickly encrusting the branchlets of an undetermined small-leaved, spiny shrub growing in the Parkes district, New South Wales (D. Ploughman).

The female tests, pear-shaped, with the ventral surface flattened against the bark, forms an almost complete sack of pale yellow granulated waxy secretion, fringed with beautifully glassy filaments. The anterior portion forms a short rounded tube with an irregular anal opening at the tip. Length about $\frac{1}{16}$ of an inch, slightly longer than broad.

Adult female dark reddish-brown, when boiled in potash, showing a pear-shaped form, which is lost when mounted. Antennæ, and legs aborted, epidermis covered with figure-of-eight pores running in rows, with other single scattered pores. Anal segment produced into two small lobes each bearing a slender hair, with a short spine-like hair on either side of each lobe. The anal ring close to the lobes, with a small anal plate, and a ring of six hairs. This handsome species agrees with Green's definition of the genus, the test having the typical form, with the addition of the delicate fringe along the outer margin found in the members of the genus *Asterolecanium*. There may be eight hairs on the anal ring, but I can only make out six.

Genus XXX. *Kermes*, Boitard.

Manuel d'Entomologie, p. 171. 1828.
Targioni-Tozzetti, *Catalogue*, p. 40. 1869.
S'gnoret, *Ann. Soc. Ent., France* (5), vol. iv, p. 547. 1874.
Cockerell, *Canadian Entomologist*, vol. xxxi, p. 276. 1899.
Newstead, *Mon. British Coccidæ*, vol. ii, p. 138. 1902.

The adult females of this genus are berry or gall-shaped insects that have more or less well developed legs and antennæ (with a few exceptions, as in *Kermes acaciæ*). They are naked, or lightly covered with secretion, the antennæ consisting of not more than six joints. The anal ring is not fringed with hairs, and the anal tubercles are wanting or are very inconspicuous.

The male coccid forms a felted sac or puparium. The larvæ have well-developed anal lobes. Newstead has figured the British species. It is from several species of this genus that the valuable commercial colouring matter is obtained.

Twenty-seven species have been described from Europe and North America, all of which are found upon oak trees. The single species described from Australia is found upon an *Acacia*.

Kermes acaciæ, Maskell.

Trans. N. Z. Institute, vol. xxvi, p. 83, pl. iv, figs. 15–18. 1893.

The type specimen was collected by Mr. Olliff upon the twigs of a wattle (*Acacia*, sp.) near Sydney. I have no other record of this rare coccid.

Adult female dark red, almost globular in form, with a small opening beneath. Antennæ and feet wanting. Abdominal cleft only distinguished by a small cleft on the edge of the basal orifice, forming a narrow depression along the dorsum to a black spot, where there is a small opening and two very small lobes. The epidermis is wrinkled, after treatment in potash, showing great numbers of a small conical pointed pustules. Diameter of coccid $\frac{1}{5}$ of an inch. Maskell detribes the typical larvæ and considers this species comes nearest to *Kermes vermilio*.

232. *Kermes acaciæ*. Cat. Coccidæ, p. 60.

Genus XXXI. *Rhizococcus*, Signoret.

Ann. Soc. Ent., France (5), vol. v, p. 36. 1875.
Maskell, *Coccidæ of New Zealand*, p. 96. 1887.
Cockerell, *Canadian Entomologist*, vol. xxxi, p. 276. 1899.

Though the original type for this genus was described by Dr. Signoret from France upon the roots of a daphne, all the other species, with one exception, are found upon the twigs and foliage, and fourteen of the sixteen listed are described from New Zealand and Australia, while Green has recently described two more from Australia. From a study of a good deal of live material I think that with further investigation several of the species described upon the Casuarinas as distinct will be found at the least to be only varieties. Maskell defines the genus as follows: "Adult female naked, usually stationary, body segmented; anal tubercles conspicuous. Antennæ of six or seven joints. Feet present. Anogenital ring inconspicuous with fine hairs. Male pupa enclosed in a cottony sac."

Rhizococcus bicolor, n.sp.

This species was collected upon the foliage of a myall (*Acacia*, sp.) by Mr. L. J. Newman, at Dowering, Western Australia.

Adult female blackish purple with yellowish markings, broadly oval, very much wrinkled, and cleft on the under surface when resting on the fine branchlets; segmental divisions evidently well defined when alive. Length about $\frac{1}{7}$ of an inch.

Antennæ six-jointed, first short angulated, second shorter than third, fourth shorter than third, fifth about the same length, sixth twice as long as the last two combined; rounded at the extremity with scattered hairs on sides. Legs stout, tibia slender, tarsus with four hairs on sides, digitules long slender hairs curled and slightly thickened at the tips. Anal lobes represented by two chitinous areas with a group of short blunt spine. Anal ring large with six long hairs. Epidermis covered with circular pores and short hair-like spines.

Rhizococcus casuarinæ, Maskell.

Trans. New Zealand Institute, vol. xxv, p. 230, pl. xv, fig. 7. 1892.
The Entomologist, vol. xxvii, p. 46. 1894.

This coccid was found at Myrniong, Victoria, upon the branchlets of a she-oak (*Casuarina suberosa*), and at Cheltenham, Victoria, on *Casuarina distyla* (French).

The adult female varies in colour from yellow to dark red; the form normal, with slight segmentation. Length about $\frac{1}{5}$ of an inch. Antennae six-jointed, of which the third is as long as the rest combined. Feet normal. Anal

tubercles hidden before treatment with potash. Dorsum bearing some slender spines, some of which are very long. Maskell says : " This is another species allied to *R. grandis*, but it appears to differ from that sufficiently in the antennæ, and principally in the rows of very strong spines on the dorsum of the larvæ." In his plate he figures the larva.

261. *Rhizococcus casuarinæ*. Cat. Coccidæ, p. 66.

Rhizococcus grandis, Maskell.

Trans. N. Zealand Institute, vol. xxiv, p. 29, pl. vi, figs. 1–2, 1891, vol. xxv, p. 230. 1892.

This is an underground species found upon the roots of a wattle (*Acacia longifolia*) in Victoria.

Adult female dark red, naked, convex, and subglobular in form, with distinct segmental divisions. Maskell says : " This very large insect has much the appearance to the naked eye of *Coccus cacti* (the cochineal insect), being very much the same size and colour. Length about $\frac{1}{5}$ of an inch.

Antennæ composed of six joints, the second longest, first, third, and sixth shorter about the same length; fourth and fifth the shortest; on the terminal one, several short hairs. Feet slender, tibia with spine, upper digitules fine hairs, lower pair slightly dilated. Anal ring with eight hairs, on the dorsum scattered slender hairs."

Maskell described another form from the same locality on an allied wattle (*Acacia implexa*), which he called var. *spinosior*. The differences were the more numerous dorsal spines and the lower pair of digitules more dilated. He does not state in his description if this variety is a subterranean one like *R. grandis*.

265. *Rhizococcus grandis*. Cat. Coccidæ, p. 66.

Rhizococcus lecanioides, Green (Fig. 46).

Bull. Entom. Research, vol. vi, pt. i, p. 47, fig. 4. 1915.

This curious species is found upon the branchelts of a she-oak (*Casuarina distyla*) at Sandringham, Victoria (French).

Adult female dark brown; smooth, without any defined segmentation, variable in form, convex and pear-shaped; others shaped like small cowrie shells, with the margin of the under-surface curled on to the branchlets. Antennæ and legs very small; the joints of the antennæ very indistinct, apparently six-jointed, third longest. Tarsus very long. Anal lobes large, prominent, chitinous and wrinkled, with a short seta on each lobe. Derm without spines, but thickly set with small oval chitinous lenticels. Anal ring with eight stout setæ. Length about $\frac{1}{12}$ of an inch. (Abridged from Green's description.)

Rhizococcus lidgetti, Cockerell.

Victorian Naturalist, vol. xvi, p. 88. 1899.

This species was collected on the twigs of a wattle (*Acacia estrophiolata*) at Myrniong, Victoria.

"Female coccids on twigs, very dark purple, naked even when full of young. Boiled in caustic soda they give out a fine magenta colour; the female boiled and flattened out under a cover glass is 4 mm. long and 2½ broad. Mouth parts very small. Legs and antennæ very pale. Dermal spines numerous."

It differs from all the other Australian species in having seven-jointed antennæ and in a few minor details.

267. *Rhizococcus lidgetti*. Cat. Coccidæ, p. 67.

Rhizococcus lobulatus, Green (Fig. 47).

Bull. Entom. Research, vol. vi, pt. i, p. 46, fig. 3. 1915.

This curious coccid is not uncommon on the foliage of the "Weeping Myall" (*Acacia pendula*), one of our most graceful western scrub trees. I have it originally from Bramble Station, near Condobolin, New South Wales; it was sent to Mr. Green in 1901. Other localities where it has been found are Parkes, Yanco, and Forbes.

The adult females naked, dark reddish brown with a few white woolly filaments under the anal portion, resting stationary on the leaf or twig; broadly oval, convex, wrinkled, tapering slightly to the anal extremity and showing segmental divisions on the apical portion. Length about ⅛ of an inch.

Antennæ with six joints, fifth shortest, sixth longest. Legs small, but stout; claw stout. Anal lobes forming eight prominent projections, the median pair longest; anal ring with six hairs. Epidermis covered with circular pores and short spiny hairs.

Rhizococcus mancus, Maskell (Fig. 48).

R. casuarinæ var. *mancus*, *Trans. N. Zealand Institute*, vol. xxix, p. 316. 1897.

This is a typical form of the species of this genus affecting the axils of the different species of she-oaks (*Casuarina*) in our coastal districts. It was originally described from specimens collected at Manly, New South Wales, upon *Casuarina distyla*. I have it upon an undetermined species of *Casuarina* growing at Wagga, New South Wales, and have examined many living specimens.

The adult female is found on the surface of the bark, but finally attached in most cases to the branchlet at the junction of the smaller twigs. General colour bright red, interspersed with small white dots, markings of brown, black or grey, changing to dull green on the flattened dorsal surface and sides; the whole covered with fine short scattered white spines. Dorsal surface flattened with a slightly raised rim or ridge on either side with six rows of three

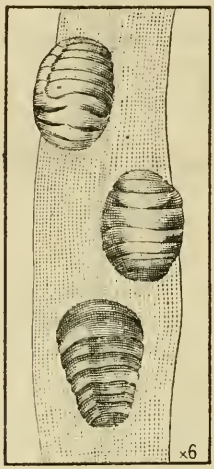

Fig. 47.—*Rhizococcus lobulatus*, n.sp.

Fig. 49.—*Rhizococcus viridis.*

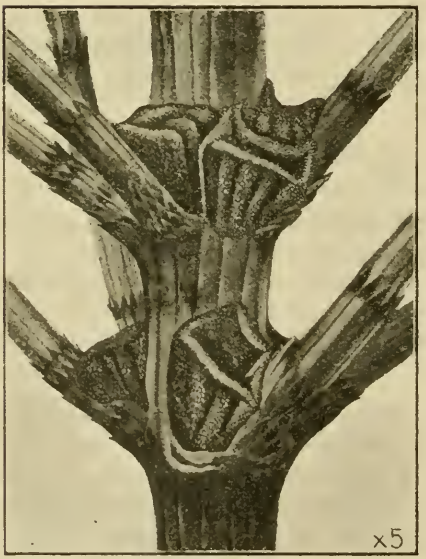

Fig. 48.—*Rhizococcus munens.*

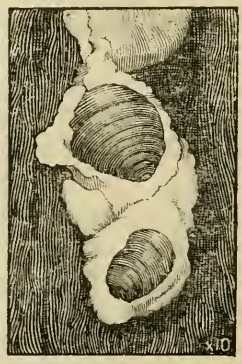

Fig. 50.—*Cossyphia syncarpiæ*, n.sp.

deep punctures or pits, covering the dorsal area. The sides flattened with apparently the same number of rows of more irregular pits. Ventral surface angular, thus giving the whole coccid a wedge-like shape. Length $\frac{1}{5}$ of an inch, width on flattened surface $\frac{1}{8}$ of an inch.

In specimens resting on the surface of the bark not constricted by the angle of the twigs the under-surface is slightly concave and the upper surface convex with two transverse carinæ and similar depressions.

Antennæ six-jointed, first and second short, third large, long, longer than the fourth, fifth, and sixth combined. Legs moderate, tarsus long. Anal segment rounded on either side, distinct, curled under the coccid. Epidermis covered with fine spiny hairs.

Larva resting in the cavity under the abdomen caused by the tip of the abdomen turning downward. Colour bright red with the legs and antennæ lighter; front rounded, tapering to the tip of the abdomen, with the dorsal surface bearing rows of fine white spines, the outer one forming a regular fringe, anal tubercles with a long white seta.

Rhizococcus pustulatus, Maskell.

Trans. N. Zealand Institute, vol. xxv, p. 231, pl. xv, figs. 8–9. 1892.

This species is another sent from Myrniong, Victoria, upon the branchlets of a she-oak (*Casuarina*, sp.)

It has the general form of *R. casuarinæ*, but the adult female has no legs. "Dark red, convex, sub-elliptical and tapering somewhat posteriorly; the dorsum exhibits two longitudinal grooves on the upper surface and two others more shallow near the margins, and in these grooves are some rather long shallow depressions or pits; the epidermis is rough with great numbers of very minute pustules. Length of insect about $\frac{1}{15}$ in. Anal tubercles small, but conspicuous. Antennæ short with six joints, of which the fourth and fifth are shortest. Feet absent. Anogenital ring with eight hairs. Mentum dimerous. The dorsal pustules are very noticeable after treatment with potash."

Allied to *R. casuarinæ* and *R. grandis*, but besides being legless is distinguished by the dorsal corrugations, shallow pits and minute pustules.

270. *Rhizococcus pustulatus*. Cat. Coccidæ. p. 67.

Rhizococcus tripartitus, Fuller.

Journal of Dept. of Agriculture, West Australia, vol. iv, p. 1345. 1897.
Trans. Ent. Soc., London, p. 443. 1899.

This species comes from Western Australia, found upon the axils of the branchlets of the she-oaks (*Casuarina*, sp.).

According to Fuller's description this species is very closely allied to, if not identical with, one of Maskell's species *R. mancus*, which he considers a variety of *R. casuarinæ*. I think that these three are probably only the

same coccids under different surroundings, or when upon the axils of the branchlets of the *Casuarina* it becomes wedge-shaped, as in the typical *R. mangus* and *R. tripartitus*, when upon the side of the branchlet it is more a convex wrinkled coccid as in the typical *R. casuarinæ*. I can find both forms of adult female coccid in the examination of a large series of fresh species of *R. mangus*, but the wedge-shaped form is the common one in the *Casuarina*. The coloration is also variable in a large series.

273. *Rhizococcus tripartitus*. Cat. Coccidæ, p. 67.

Rhizococcus viridis, Green (Fig. 49).

Pro. Linn. Soc. N. S. Wales, vol. xxv, p. 559, pl. xxxvii, figs. 1–3. 1900.
Froggatt, *Agric. Gazette N. S. Wales*, vol. vii, p. 20. 1902.

The type specimens were found scattered over the young foliage and twigs of the Black Wattle (*Acacia decurrens*) growing at Mittagong, New South Wales. Mr. T. McCarthy has since collected it upon *Acacia prominens* at Lakemba, near Sydney. I noted it in my list of "Insects of the Wattle Trees."

Adult female when alive deep green, changing at death to a dull purplish brown with a little white meal on the dorsal surface. Length about $\frac{1}{8}$ of an inch. Elongate oval, very convex, tapering slightly to the anal segment; concave beneath, with the margins curved in when attached to a twig. Antennæ six-jointed, basal one short, broad, somewhat angular, last one longer than the fourth and fifth combined, with the extremity round and with a few scattered hairs. Legs short stout, tarsus nearly as long as tibia. Digitules fine hairs (according to Green), but in my specimens the tips seem to be curled round and slightly thickened. Anal ring with six hairs. The outer margin of the last two abdominal segments on either side of the anal tubercles rounded and furnished with stout spiny hairs; the anal lobes rounded, projecting, chitinous, dull yellow with short stiff spiny hairs. Epidermis with many fine circular pores and long sharp spines.

274. *Rhizococcus viridis*. Cat. Coccidæ, p. 66.

Genus XXXII. *Gossyparia*, Signoret.

Ann. Soc. Ent., France (5), vol. 5, p. 20. 1875.
Maskell, *Trans. N. Zealand Institute*, vol. xxii, p. 227. 1892.

In this genus the adult female, though naked, rests upon and is surrounded with a pad of white cottony secretion so that only her dorsal surface appears to be naked, but when dead is easily detached from the surrounding secretion. The feet and antennæ are well developed. The typical form is the elm-tree scale (*Gossyparia spuria*), common in Europe and North America.

This in point of numbers is a small genus containing only six described species, three of which are peculiar to Australia, one from New Zealand, another on the *Tamarix* in Asia Minor, Northern Africa, and Eastern Europe, and the elm-tree scale.

Gossyparia casuarinæ, Maskell.

Trans. New Zealand Institute, vol. xxv, pl. xiv, figs. 12–13. 1892.

Specimens of this species were collected upon the branchlets of an undetermined species of *Casuarina*, near Sydney, New South Wales.

Adult female varying from dark to light brown, elliptical, convex, elongated, resting upon a cushion of woolly secretion with the back uncovered. Length about $\frac{1}{16}$ of an inch. Antennæ six-jointed, the third longest, the fourth and fifth the shortest. Feet with the tarsus longer than the tibia; digitules fine hairs. Anal tubercles distinct. Mentum dimerous. The margin of the body fringed with close slender spines.

Maskell says: "The cushion of grey cotton in this species is more scanty than is usual in this genus, almost the whole insect being exposed instead of only the dorsum as is ordinary.

275. *Gossyparia casuarinæ*. Cat. Coccidæ, p. 68.

Gossyparia confluens, Maskell.

Trans. New Zealand Institute, vol. xxv, p. 227, pl. xiv, fig. 4. 1892.

This species was also sent to Mr. Maskell about the same time as the previous one, from near Sydney, New South Wales, found upon an undetermined species of *Eucalyptus*.

The adult females produce a mass of white cottony secretion, sometimes tinged with yellow, upon the twigs of the gum-tree, in which a number are enveloped but not hidden in the confluent mass of filaments. The naked female is dark-red, convex, elongate oval, antennæ six-jointed, first three longest, of equal length. Feet rather long, tarsus longer than tibia. Anal tubercles well defined. Epidermis covered with fine slender spines, anal ring with eight hairs.

277. *Gossyparia confluens*. Cat. Coccidæ, p. 68.

Gossyparia syncarpiæ, n.sp. (Fig. 50).

I collected this species upon the foliage of the Turpentine gum (*Syncarpia laurifolia*) near Gosford, New South Wales, where it was very plentiful. This species was determined for me by Mr. E. E. Green some years ago.

The adult female rests upon a cushion of cottony secretion, in which she is encircled, but the greater part of the dorsal surface is exposed. General colour dull purplish-black, convex, broadly rounded, tapering slightly to the tip of the abdomen, with the segmental divisions well defined. Length about $\frac{1}{16}$ of an inch. Antennæ with six joints.

Genus XXXIII. *Eriococcus*, Targioni-Tozzetti.

Signoret, *Ann. Soc. Ent., France* (5), vol. v, p. 29. 1875.
Comstock, *Report U.S. Dep. Agriculture*, p. 337. 1880.
Maskell, *Coccidæ of New Zealand*, p. 92. 1887.
Newstead, *Mon. of British Coccidæ*, vol. ii, p. 195. 1902.
Catalogue, p. 33. 1869.

The adult female has the body elongated, or ovate, segmented; the dorsal surface or margin generally spiny. Maskell says: "Several rows of conical spines on the dorsal surface. Antennæ composed of six or seven joints. Legs present. Anal tubercles conspicuous. Anal orifice with six or eight hairs.

"The adult female enclosed in an ovisac of white or yellow felted cotton, elliptical, elongated, oval, and more or less convex, with or without an opening at the anal extremity.

"Male puparium resembling that of the female, but smaller. Australia is very rich in species of this genus. Out of some sixty species described from all parts of the world, about half of them are peculiar to Australia."

Many of our species excrete so much honey-dew that the plants they infest and the ovisacs of the coccids become so thickly coated with fumagine that they are difficult to study or identify from their outward appearance.

In the *Victorian Naturalist*, vol. xxi, 1904, Mr. E. E. Green gives a catalogue of the Australian species in parallel columns, showing the characters and food-plants of the different species recorded up to that date. In a paper "On Some Coccid Pests of Economic Importance," published in the *Journal of Economic Biology*, 1910, Green points out that Maskell's *Eriococcus paradoxus* and *E. paradoxus*, var. *simplex* have to be removed from this genus, and he places them in the genus *Cerococcus*. I have therefore left them to be dealt with in my supplement.

Eriococcus agonis, Fuller.

Journal of Dept. of Agriculture, West Australia, vol. iv, p. 1345. 1897.
Trans. Ent. Soc. London, p. 439. 1899.

This species was described from specimens collected upon the foliage of the "Native Peppermint" (*Agonis flexuosa*), near Perth, Western Australia.

Adult female enclosed in an elongate oval sac of loose texture, probably white, but usually discolored with fumagine.

Female coccid purple, segmented, elongate, convex. Length 0·06 inch. Antennæ tapering, with seven joints, second and third subequal, last longest, sometimes appearing to consist of two joints. Tarsus twice the length of the tibia; digitules present. Anal tubercles normal, each bearing five spines: one on either side and three at the base: a thornlike spine upon the inner margin and a long slender one at the tip. Anal ring probably with eight hairs. Dorsum with a few scattered spines and two upon the margin of each segment.

285. *Eriococcus agonis*. Cat. Coccidæ, p. 71.

Eriococcus apiomorphæ, Fuller.

Journal of Dept. of Agriculture, West Australia, vol. iv, p. 1345. 1897.
Trans. Ent. Soc., London, p. 439. 1899.

The type specimens were described from coccids obtained in the empty galls of a gall coccid (*Apiomorpha maliformis*) on a eucalypt.

Adult female globose, forming a thick white compact convex sac measuring 0·2 inch in length.

Antennæ composed of seven joints, the second, third, and fourth subequal, seventh smaller, but longer than fifth and sixth. Legs slender, tarsus longer than tibia, upper digitules knobbed, lower ones fine hairs. Anal tubercles small cylindrical, apex almost truncate, terminating in a long seta: two spines at base, and one on the lateral margin. Anal ring with eight hairs. Dorsum with many small acuminate spines with a marginal fringe of large spines arranged at regular intervals.

286. *Eriococcus apiomorphæ*. Cat. Coccidae, p. 71.

Eriococcus angulatus, n.sp.

Specimens scattered over the foliage of the Norfolk Island Pine (*Araucaria excelsa*) collected at Perth, Western Australia, by Mr. J. L. Newman.

Adult female forming a broad, rounded, slightly-flattened, but convex white sac, formed of thin, rather soft white cotton secretion, with no distinct anal opening. Length up to $\frac{1}{10}$ of an inch.

Adult female yellow, when alive filling the sac. Antennæ rather long, slender, composed of seven joints, second long, third much longer, fourth short, fifth and sixth small, more oval in form, seventh small, rounded, hairy. Feet long, slender, tarsus as long as tibia, digitules dilated at the tips. Anal ring with eight hairs. Anal tubercles broad at the base, sides straight with angulated cleft on the outer margin below the tip with a stout spine at base and at cleft a similar spine on the inner margin and a slender seta at tip. Derm with a marginal fringe of stout spines and the surface covered with small circular spinnerets.

At first I thought this was the typical *E. araucariæ*, but it seems quite distinct; the difference in the antennæ, legs, fine spinnerets on the epidermis, and the anal tubercles are very marked. While all the specimens of the typical forms on the Araucaria and Kunzia cover the foliage with black smut, the foliage of the pine infested by this species is perfectly clean and the sacs pure white.

Eriococcus araucariæ, Maskell (Fig. 1).

Trans. N. Zealand Institute, vol. xi, p. 218, 1878; and vol. xxvii. p. 64. 1894.
Coccidæ of New Zealand, p. 93. 1887.
Rhizococcus araucariæ, Comstock, *Report U.S. Dep. Agriculture*, p. 41. 1880.
„ „ Comstock, *Second Report, Cornell University*, p. 137. 1883.
Ulleria araucariæ, Cooke, *Insects, Fruit and Forest Trees, California*, p. 41. 1881.

This is the white scale of the Norfolk Island Pine (*Araucaria excelsa*), and is also found on other pines of this genus. It was first recorded upon trees growing at Canterbury, New Zealand, but it has spread to other countries with its food-plant, and is now recorded from Ceylon, Sandwich Islands, South Africa, California, and Australia.

Fig. 51.—*Eriococcus araucariæ*.

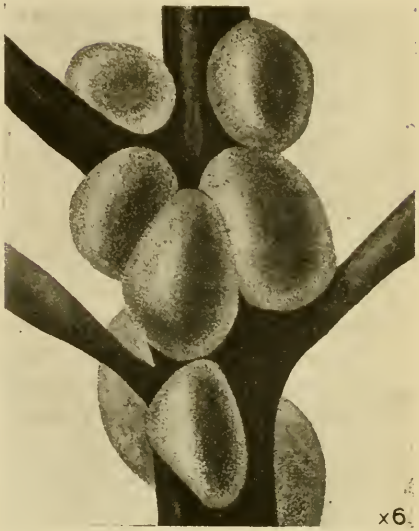

Fig. 52. *Eriococcus husariæ*, n.sp.

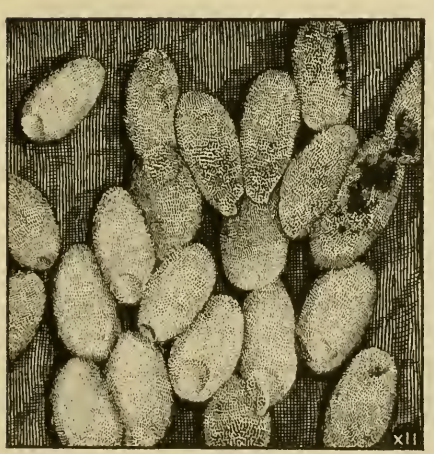

Fig. 53.—*Eriococcus confusus*.

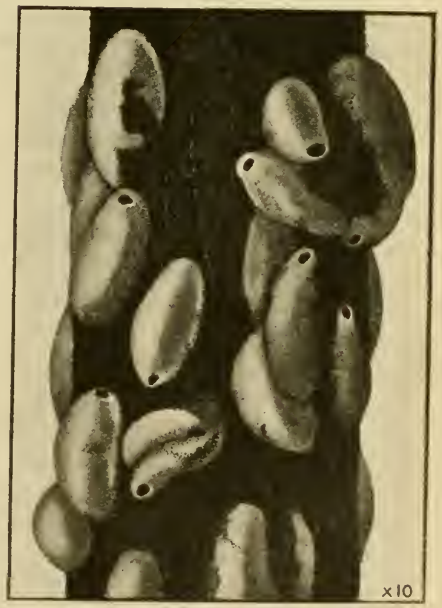

Fig. 54.—*Eriococcus crofti*, n.sp.

Sac of adult female white, elongated, cottony, often in masses. Length, $\frac{1}{10}$ of an inch. Adult female elongate oval, convex, distinctly segmented, and of a yellow colour with the anal tubercles brown. Antennæ with six joints. Feet normal. Anal ring small, with eight hairs. Anal tubercles short, blunt, angulate on the sides with three stout spines on the outer margin, a slender one on the inner, and a fine seta at the tip. Derm with a marginal fringe of stout, rather blunt spines, dorsum not showing any other spines or spinnerets in any number.

Maskell described the type very briefly, and his figures give very little detail. This is amended in his "Coccidæ of New Zealand," but the figure of the anal tubercles is not correct. Comstock's first report adds very little and his figure of the anal segment is worse. I have not been able to consult Comstock's second report. Maskell described a variety obtained at Manly, New South Wales, upon *Kunzia capitata* as *E. araucariæ*, var. *minor*, of which he says, "Length about $\frac{1}{30}$ of an inch; antennæ, six subequal joints as in type; feet, anal ring, and anal tubercles as in type; marginal spines rather shorter and stronger than in type."

The food-plants of both are always thickly covered with black smut through the presence of the coccids.

287. *Eriococcus araucariæ*. Cat. Coccidæ, p. 71.

Eriococcus busariæ, n.sp. (Fig. 52).

This fine species comes from Nimitybelle, New South Wales, upon the twigs and foliage of the "Native Blackthorn" (*Busaria spinosa*).

Sac of adult female broadly oval, rounded at the extremities, and fitting close against the bark; the anal opening in a slight depression well up from the edge. Length, $\frac{1}{8}$ of an inch. Composed of closely-felted fibres with a slight transverse structure; the surface roughened with fine downy hairs, like a bit of tweed cloth. Colour bright buff or reddish-brown. Clustering together, they are somewhat irregular in form.

Adult female ochreous yellow, broadly oval; about $\frac{1}{10}$ of an inch in length. Antennæ composed of eight rather long joints, the first short, broad; second broad, third longest, fourth and fifth smaller, sixth and seventh rounded on the sides, eighth long rounded at tip, hairy. Legs long, tarsus about the same length as the tibia; claw short; digitules long hairs. Anal ring with eight hairs. Anal tubercles very short, very broad at the base, with two deep curves on the inner margin, so that the upper portion is narrow and roundedi with a terminal seta on either edge. The whole of the epidermis covered with scattered short yellow conical thorn-like spines, and thickly clothed with fine hairs.

This species comes in the *Eriococcus eucalypti* group, but is a much larger coccid, with the spines widely scattered, longer eight-jointed antennæ and distinctive anal tubercles.

Eriococcus buxi, Fonscolombe.

Coccus buxi, Ann. Soc. Ent., France vol. iii, p. 218. 1834.
Eriococcus buxi, Targioni-Tozzetti, *Catalogue*, p. 33. 1869.
,, Signoret, *Ann. Soc. Ent., France* (5), vol. v, p. 30. 1875.
,, var. *australis*, Maskell, *Trans. N. Zealand Institute*, vol. xxvii, p. 65, 1894; and vol. xxviii, p. 339, 1896.

The type is described from Europe upon the common shrub *Buxus sempervirens*. Signoret says that the sacs of both male and female coccids are pure white. The adult female rounded, oval. Antennæ composed of six segments, the third segment longest, fourth and fifth shorter, sixth straight, as long as the second, hairy. Dorsum covered with short tubular filaments of uniform thickness and other scattered, pointed ones. Tibia as long as tarsus, claw small, digitules large, thickened at the tips. Anal ring with eight hairs.

Maskell has given our species the varietal name of *Australis*. Specimens of this variety are recorded from Manly, New South Wales, on a native shrub, *Trachymone billardieri*, from Grafton, New South Wales, on an undetermined shrub, and from the Botanic Gardens, Brisbane, Queensland.

The female sacs are usually on the under-surface of the leaves, of the typical snow-white colour and elongate oval form, with the outer surface soft and woolly; about $\frac{1}{10}$ of an inch in length. Antennæ six-jointed, third longest. The digitules all fine hairs. Maskell says: "I could perhaps mention a number of very minute characters on which this insect differs from the type, but the most important are the digitules not being dilated or knobbed, and the marginal spines on the larvæ being small instead of very conspicuous, as in *E. buxi*.

295. *Eriococcus buxi*. Cat. Coccidæ, p. 72.

Eriococcus confusus, Maskell (Fig. 53).

Trans. N. Zealand Institute, vol. xxiv, p. 26, pl. iv, figs. 5–8. 1891.

The type specimens were sent from Victoria thickly congregated together upon the surface of the bark of *Eucalyptus viminalis*. I have specimens thickly coating the inner layer of bark covered with a scale of dry bark taken off the trunks of eucalypts in the park at Richmond, New South Wales, that were determined by Maskell as this species. In these specimens the ovisacs are flattened on the dorsal surface from the pressure of the dead bark, and they are pure white.

Maskell says: "Sac of adult female dirty white or grey, aggregated in rough, irregular masses on the twigs (?) of the plant; loosely felted; the normal form is globular, slightly elongated, length about $\frac{1}{20}$ inch."

Adult female brownish yellow, sub-globular. Antennæ composed of six joints, fourth and fifth shortest. Epidermis with many simple circular orifices and long slender spines, with a few spiny hairs. Anal ring large, with eight hairs.

297. *Eriococcus confusus*. Cat. Coccidæ, p. 73.

Eriococcus coriaceus, Maskell (Figs. 55, 56, and 57).

Trans. N. Zealand Institute, vol. xv, p. 229, pl. xv, figs. 1–3. 1892.
Gurney, *Report 7th Meeting Aust. Assoc. Science*, p. 273. 1898.
Froggatt, *Agric. Gazette N.S. Wales*, vol. xi, p. 101. 1900.

This is the commonest species of this genus, and it is widely distributed over Australia upon many different species of eucalyptus. There are many variations in colour, but the general form is regular unless massed together. Besides the regular host plant I have once found it upon a cultivated myrtle at a plant nursery at Goulburn, New South Wales.

Kirk records it as doing a great deal of damage to plantations of young blue gums (*Eucalyptus globulus*) in New Zealand, into which country it was accidentally introduced some years ago. We find it always more vigorous upon all kinds of cultivated gums, in gardens and avenues, than in the native bush, where it has many enemies among the ladybird beetles and scale-eating moths.

Sac of adult female formed of a closely-felted papery secretion, egg-shaped in form, attached on the under surface to the leaf or twig (a complete sac), with a well-defined circular opening at the apex on the dorsal surface. The colour variable from almost pure white to yellowish, buff, reddish, to a bluish creamy tint. Length, $\frac{1}{16}$ of an inch. When massed together the tapered oval or rounded egg-shaped form is often altered.

Adult female fitting closely into the sac with the tip of the abdomen exposed under the apical opening, broadly oval, showing abdominal segmentation. Colour dark red, giving off a rich reddish-brown stain when crushed, when placed in caustic potash turning it to a bright carmine. In living specimens there are usually several white curled filaments protruding from the anal opening.

Antennæ seven-jointed—first, broad; second, thickened, longer; third and fourth, longer than second; fifth and sixth, short, indistinct; seventh, short. Legs, normal; tarsus, long; digitules, fine hairs. Anal tubercles standing out at tip of abdomen, dark coloured, stout, finger-shaped, with three stout spiny hairs on the outer side, two on the inner margins, with terminal setæ. Anal ring with eight flat hairs. Epidermis covered with fine spines, short truncate rods and circular orifices.

My description is taken from a large series of living specimens. Maskell's description is brief, and his figures somewhat misleading.

299. *Eriococcus coriaceus*. Cat. Coccidæ, p. 73.

Eriococcus crofti, n.sp. (Fig. 54).

The female coccids thickly scattered over the bark of the young branchlets of the Peppermint Gum (*Eucalyptus piperita*) growing at Salisbury Court, near Uralla, New South Wales. The infestation by these scale insects causes the bark to crack, flake, and become greasy-looking and blackened. Half buried in these surface cracks, many of the coccids form their sacs.

Fig. 55. *Eriococcus coriaceus.* Male (immature).

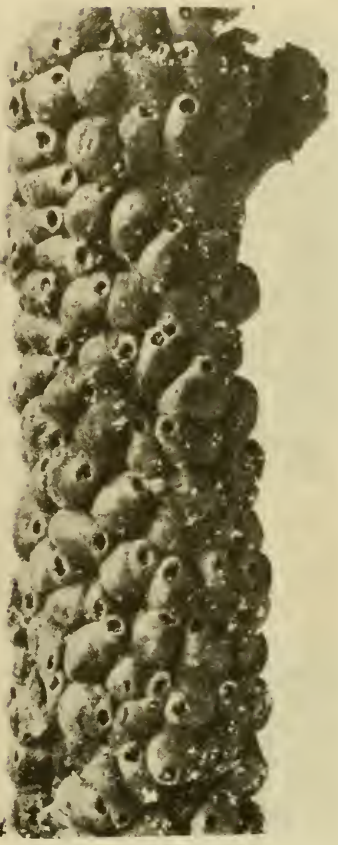

Fig. 56. *Eriococcus coriaceus.* Male.

Fig. 57.—*Eriococcus coriaceus* var.

Sac of adult female elongate oval, somewhat irregular in form, consisting of a complete sac of stiff leathery secretion, showing no woolly filaments: with a large circular anal aperture. General colour, biscuit-brown with a yellowish tint. Length, about $\frac{1}{8}$ of an inch.

Adult female pear-shaped, showing abdominal segments; general colour, reddish brown, giving off a dull red in potash. Antennæ seven-jointed fourth, fifth, and sixth tapering, sixth shortest; seventh, rounded, hairy. Legs moderate, tibia shorter than tarsus, claw large, digitules long, do not appear to be thickened. Anal ring with apparently eight hairs. Anal tubercles large, swelling out about the middle, where a stout seta springs out on the inner margin, but no corresponding one on the outer margin, a single stout spine at base, on outer margin. Epidermis thick, covered with circular orifices, short rods and fine transparent spines. The large marginal spines extending round the body, but on the abdominal segments supplemented with a middle pair, so that there is a transverse bunch of three pairs of spines on each of the abdominal segments.

This species belongs to the *Eriococcus coriaceus* group with leathery sacs with apical orifices, but corrodes the bark like *E. tepperi*; it is, however, very distinct from the latter species as defined by Maskell.

I have named this distinct species in honor of Hugh Croft, Esq., manager of Salisbury Court, to whom I am indebted for many kindnesses.

Eriococcus cyprææformis, Fuller (Fig. 58).

Journal of Department of Agriculture, West Australia, vol. iv, p. 1345. 1897.
Trans. Ent. Soc., London, p. 440. 1899.

This species comes from Western Australia, and was found upon the branchlets of a she-oak (*Casuarina*, sp.). I have specimens from Mr. A. M. Lea. The ovisac is formed of a dark chocolate-brown leathery or felted secretion, clouded with black, probably caused from fumagine: broadly oval, very convex, and fitting close to the bark, apparently no anal opening. Length, $\frac{1}{16}$ of an inch. Fuller says in his first description, "Sac very convex, smooth, shining, brown, resembling a small 'snake-head' shell."

Adult female fitting close into the sac when alive. Antennæ with seven joints—first, thick; second, short; third and fourth, subequal; sixth and seventh, subequal. Legs, long. Anal tubercles large, chitinous, roughened, tapering; each with two spines on inner margin, and one on the outer side at the apex. Dorsum with irregular oval and circular pores and many spines.

301. *Eriococcus cyprææformis*. Cat. Coccidæ, p. 73.

Fig. 58. *Eriococcus cupreæformis.*

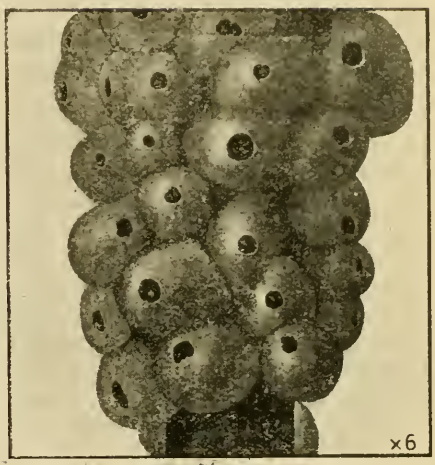

Fig. 60. *Eriococcus gregarius.* n.sp.

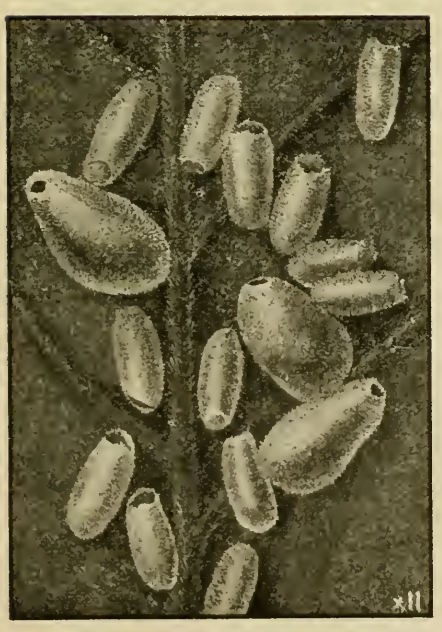

Fig. 59.—*Eriococcus eucalypti.*

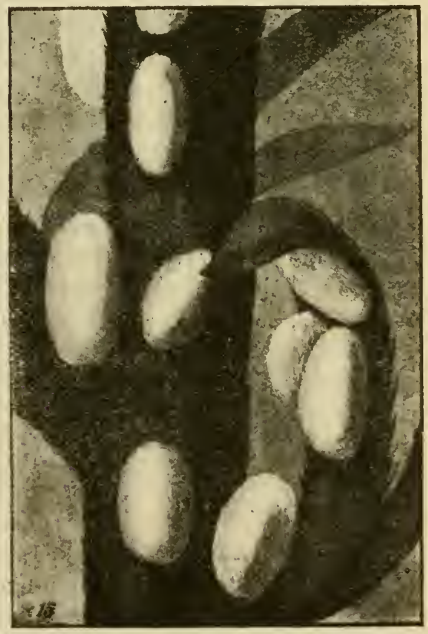

Fig. 61. *Eriococcus leptospermi.*

Eriococcus elegans, Fuller.

Journal West Australian Bureau of Agriculture, vol. iv, p. 1345. 1897.
Trans. Ent. Soc., London, p. 440, pl. xv, fig. 4. 1899.

This species is found on the axils of the branchlets of a she-oak (*Casuarina humilis*) from near Perth, Western Australia.

The adult female does not make a true sac, but is covered with a number of fine cottony filaments in three distinct rows of well-defined curling pyramidal tufts, and are completely covered as they rest in the axils of the twigs.

Adult female reddish brown, convex, elongate, showing segmental divisions. Length, 0·1 inch. Antennæ rather long, composed of six joints. Legs, ample; tarsus, longer than tibia, upper digitules long. Anal ring with eight hairs. Anal tubercles conical with spines and long setæ. Dorsum densely clothed with short conical spines and many protruding spinnerets. Fuller says: "This species is clearly an *Eriococcus*, but the dorsal covering could never be regarded as a sac."

306. *Eriococcus elegans*. Cat. Coccidæ, p. 74.

Eriococcus eucalypti, Maskell (Fig. 59).

Trans. N. Zealand Institute, vol. xxiv, p. 27. 1891.
Kœbele, *Bull.* 21, *Div. Ent. Dep. Agr., Washington, U.S.A.*, p. 14. 1890.
Froggatt, *Agric. Gazette, N. S. Wales*, vol. xi, p. 103. 1900.

A common species in South Australia and Victoria upon the foliage and twigs of the Native Blackthorn (*Busaria spinosa*) but also recorded upon *Pittosporum undatum*, *Myoporum*, sp. and *Aster* (Victoria. C. French, jun.).

Though the type was also recorded upon the foliage of *Eucalyptus diversicolor* from South Australia, I very much doubt if *E. eucalypti* is ever found upon any species of eucalyptus.

The sac of the adult female yellowish brown or buff, thickly clothed with fine white or silvery downy hairs (Maskell calls them "tubes"), so that they have a distinctly roughened appearance, over the closely felted sac. Convex, elliptical, sometimes narrowed towards the apex. Length $\frac{1}{14}$ of an inch. Anal aperture distinct. Male sac of similar structure, more elongated, with the anal end open. Length about $\frac{1}{30}$ of an inch.

Adult female dark purple to reddish, filling the rounded cavity until after egg-laying. Antennæ composed of seven joints, of which the second and third are longest. Feet normal, tibia shorter than tarsus; digitules long hairs. Anal tubercules stout, each bearing on inner side two long setæ. Anal ring with eight hairs. Epidermis very thickly covered with short angular semi-transparent thorn-like spines, hiding nearly the whole of the dorsal surface. Maskell says, "also many small circular spinnerets with slender circular tubes," but in my old material examined, the latter were almost hidden by the multitudes of short spines.

There are two allied forms described by me as new, *Eriococcus busariæ* and *E. villosa*, which seem to take the place of this species in New South Wales.

308. *Eriococcus eucalypti*. Cat. Coccidæ, p. 74.

NOTE.—There is an error in the reference in Mrs. Fernald's catalogue. Read 1891 not 1881 in date of Maskell's description.

Eriococcus gregarius, n.sp. (Fig. 60.)

Eriococcus paradoxus, Mask. Froggatt, *Agric. Gazette, N. S. Wales*, vol. xi, p. 104. 1901.

The female coccids mass their tests together on the branchlets of several species of eucalypts; they are found at Glen Innes, Albury, Mittagong, and in localities about Sydney, upon the young growth.

Adult female sacs about $\frac{1}{8}$ of an inch in length, compressed together at the base, standing on end in a mass, rounded on the summit, with a large circular anal opening. Constructed from a closely felted secretion, forming a leathery covering of a yellowish-brown tint (white at the base), but so covered with fumagine that they are often blackened, while the exuding honey-dew gives them an external glaze.

Adult female dark reddish, convex on the dorsal surface, fitting against the side of the sac, with the ventral surface somewhat flattened, after egg-laying forming a shrivelled, flattened skin against the sac with the larvæ beneath. While the female is all dark-purplish black before treatment in potash, afterwards it is seen that the dorsal surface is brownish and semi-opaque; mounted on a slide, the upper portion to the second pair of legs is brown, with the abdomen below clear. Antennæ small, seven-jointed, first broad runded, second parellel, with the third longest, fourth, fifth and sixth tapering, seventh irregular, rounded at base with a constriction in the middle, rounded at the tip, longer than the sixth, with stout, spiny hairs on the fifth, sixth and seventh. Legs well developed, slender, tarsus longer than tibia, with two spiny hairs on inner edge and the upper digitules long hairs dilated at the tips. Anal tubercles yellowish brown, short and broad, with one long seta on outer edge and several shorter ones. Anal ring large, with apparently eight hairs. Derm covered with scattered short stout spines.

The peculiar form of the masses of female sacs agrees to a certain extent with Maskell and Green's description of *Eriococcus paradoxus* and its varieties which Green states should be placed in the genus *Cerococcus*, but the enclosed female is quite distinct, and agrees in structure with the typical *Eriococcus*. The sacs are more felted, and the anal opening larger, but they are not unlike the more scattered sacs of *E. coriaceus* if they were placed upon end.

Eriococcus gurneyi. Fuller.

Trans. Ent. Soc., London, p. 441, pl. xv, fig. 9. 1899.

This species was found upon an undetermined species of Rhamanaceous plant near Perth, Western Australia. The plant was also infested with the tests of *Inglisia fossilis*.

No mention is made of the size of either the sac or the insects in Fuller's description, and the figure given in the plate is that of one of the capped glassy tubes covering the epidermis of the immature females, before they construct their sac.

Sac of adult female "complete above but not extending completely beneath the insect, tough, felted, rather flat, elliptical."

Adult female white, elongate, segmented. Dorsum thickly covered with short, stout, conical spines. Antennæ compoed of eight joints; the seventh and eighth fused. Legs slender, tarsi longer than tibia, digitules thickened at the tips. Anal tubercles cylindrical, black, with setæ. Anal ring large, with eight hairs.

In the second stage, or immature female, Fuller says: "Pink or lemon yellow; antennæ, legs and tubercles as in adult. Dorsum clothed with long cylindrical glassy tubes surmounted with conical caps, those on the abdomen being longest."

In the description of the sac, and the conical spines on the dorsum of the adult female, this species comes near the *Eriococcus coriaceus* group, but the white colour and black tubercles are different from any other known species.

315. *Eriococcus gurnegi*. Cat. Coccidæ, p. 75.

Eriococcus hakeæ, Fuller.

Journal West Australian Bureau of Agriculture, vol. iv, p. 1345. 1897.
Trans. Ent. Soc., London, p. 441, pl. xv, fig. 7. 1899.

Specimens were obtained upon the foliage of a "Needlewood" (*Hakea ilicifolia*) near Perth, Western Australia.

The sac of female buff coloured, very convex, fitting right round the coccid. Length about $\frac{1}{5}$ of an inch. Resembles that of *E. apiomorphæ*.

Adult female pink; usual form, with the dorsum covered with many conical spines, a few longer than the others; the margin of each segment furnished with a pair of longer spines, those on the abdominal segments longest. Antennæ composed of seven joints, third longest, sixth shortest. Legs large, several spines upon the tibia and tarsus: digitules present. Anal tubercles large, stout, tapering, median margins, with four to six distinct spines, lateral with three setæ. Anal ring with eight hairs.

316. *Eriococcus hakeæ*. Cat. Coccidæ, p. 75.

Eriococcus imperfectus, Fuller.

Journal West Australian Bureau of Agriculture, vol. iv, p. 1345. 1897.
Trans. Ent. Soc., London, p. 442. 1899.

The type was obtained upon an undetermined species of *Melaleuca* near Perth, Western Australia.

The sac of female white, thick, elliptical, slightly convex, incomplete beneath the coccid. Length, 0·1 inch.

Adult female fawn colour, finely segmented, with a marginal fringe of short conical spines, set at regular intervals. Antennæ composed of seven joints, the third longest, second and fourth subequal, fifth and sixth short, the seventh twice the length of the sixth. Legs large, tarsus longer than the tibia; upper digitules large. Anal tubercles conspicuous, cylindrical, conical at apex, with several long spines and setæ.

318. *Eriococcus imperfectus*. Cat. Coccidæ, p. 75.

Eriococcus irregularis, n.sp.

The male and female ovisacs have been found covering the under side of the bark of the twigs and smaller branches of the Peppermint Gum (*Eucalyptus piperita*) at Salisbury Court, Uralla, New South Wales. The bark and foliage are usually much discoloured with fumagine, and the male scales very abundant.

Adult male sacs pure white, formed of loosely felted woolly filaments, flattened, elongate oval, with the two long white setæ from the tip of the abdomen of the male projecting through the apical opening. Length about $\frac{1}{20}$ of an inch.

Adult female forming in the first instance a loose rounded mass of silvery white threads which appear to project from all over the dorsal surface until rounded together they cover her. Later on the test is elongated, narrow at base, very irregular in form, closely felted, and of a pale yellowish-brown tint. Length, $\frac{1}{7}$ of an inch.

Adult female yellowish brown, giving off a dull yellow tint in potash; convex oval, tapering to the tip of the abdomen, segmental divisions distinct. Length, $\frac{1}{16}$ of an inch. Antennæ seven-jointed, first short broad, second, third and fourth of a uniform length, fifth shortest, sixth longer, seventh rounded at the tip. Legs long, femora robust, tibia short; tarsus long; claw large; upper digitules very long, clubbed at the tips. Anal ring small, apparently eight hairs. Anal tubercles large, stout, cylindrical, rounded at the apex with a fine seta on either side of each tubercle, the outer one very long. The margin of the dorsal surface with a complete circle of rather widely separated blunt spines, the rest of the derm thickly covered with circular orifices, a few blunt transparent spines and hairs.

The male coccid of the usual form with iridescent wings, brownish yellow body and two long white anal setæ.

This species comes near *Eriococcus tepperi*, but differs from Maskell's species in having a distinct marginal fringe of stout spines and in the structure of the antennæ.

Eriococcus leptospermi, Maskell (Fig. 61).

Trans N. Zealand Institute, vol. xxiii, p. 22, pl. iv, figs. 9–14. 1890
Froggatt, *Agric. Gaz N. New South Wales*, vol. xi, p. 103 1900.

Found upon the bark of *Leptospermum lævigatum*, Melbourne, Victoria (C. French, jun.). Common on the same tree, *L. scoparium* and *Kunzia corifolia*, in the vicinity of Sydney, probably with a wide range along the eastern and southern coast. The scale-infested foliage and bark thickly covered with fumagine, discoloured, and blackened through the presence of this coccid.

Adult female sac dull white to yellowish, felted, elliptical, measuring about $\frac{1}{12}$ of an inch in length.

Adult female red, rounded, tapering to the anal segment. About $\frac{1}{18}$ of an inch in length, fringed on the margin with two rows of spines. Upper surface with two longitudinal rows of spines and other scattered ones. Antennæ consisting of six joints, the third is the longest. Legs stout, the tibia much shorter than the tarsus; the digitules fine knobbed hairs. Anal tubercles large with short setæ. Anal ring with eight hairs.

Maskell says: "This insect in the general peg-top shape of the adult female resembles *E. hoheriæ* Mask, a New Zealand species, which also constructs similar sacs on the bark of its food-plant. The Australian species differs in the character of the spines, in having only two anal tubercles and in not having the feet atrophied in the adult stage."

323. *Eriococcus leptospermi*. Cat. Coccidæ, p. 76.

Eriococcus multispinus, Maskel.

Acanthococcus multispinosus. Trans. New Zealand Institute, vol. xi, p. 127, 1878; vol. xii, p. 292, 1879; vol. xvii, p. 29, 1884.
Eriococcus multispinus, Coccidæ of New Zealand, p. 94. 1887.
" " var. *lævigatus*, Mask., *Trans. New Zealand Institute*, vol xxiii, p. 20. 1890.

The type specimens were described from New Zealand by Maskell upon *Rubus australis*, *Knightia excelsa*, and *Cyathodes acerosa*. The Australian variety on *Acacia armata*, Victoria, and on *Epacris longifolia*, Oatley, New South Wales.

Adult female sac dull yellow, nearly cylindrical, open at the anal extremity; composed of interlacing cottony fibres. Length, $\frac{1}{10}$ of an inch.

Adult female elongate oval, dull pink, covered with white meal, segmental divisions distinct. Antennæ composed of six joints, the third longest, fourth and fifth equal. Legs normal, tibia shorter than the tarsus, upper digitules long, lower short hairs. Anal ring small, with eight fine hairs; anal tubercles brownish with setæ, large. Epidermis with a number of conical spines, with the largest arranged in six longitudinal rows.

The Australian variety *E. lævigatus* is distinguished by having a smooth sac. Maskell says: "I attach it to the above species on account of the short blunt conical form, of the very numerous dorsal spines, and the short antennæ with six subequal joints, characters distinguishing *E. multispinus* from *E. pallidus* in which the spines are slender and the third antennal joint long, and from *E. raithbyi*, which has no dorsal spines and seven-jointed antennæ."

325. *Eriococcus multispinus*. Cat. Coccidæ, p. 76.

Eriococcus picta, n.sp. (Fig. 62).

This species was collected by Mr. J. L. Newman near Perth, Western Australia, upon the branchlets and leaves of an undetermined species of Eucalyptus.

The sac globular, very compact, well separated from each other, formed of a stout leathery delicate white secretion, with the centre of the apex sometimes tinted with red, fitting close to the bark, the anal portion turned up slightly, a large opening in the hind margin. Length, $\frac{1}{16}$ of an inch.

Adult female reddish, rounded, tapering to the anal extremity, pear-shaped. Legs normal. Antennæ composed of six joints like those of *E. coriaceus*. Anal tubercles somewhat similar, but shorter and broader. Anal ring with six long hairs. Derm very thickly covered with short cylindrical, truncate rods, and small circular spinnerets, but no true spines. Length, $\frac{1}{18}$ of an inch.

This might be taken for a very small solitary form of *Eriococcus coriaceus*, but differs in the structure of the anal tubercles, the rods, and absence of spines on the dorsum, as well as in size.

Eriococcus serratilobis, Green.

Bull. Ent. Research, vol. vi, pt. i, p. 45, fig. 1. 1915.

The type was described from specimens on one of the Mallee Gums (*Eucalyptus gracilis*) collected by Mr. C. French, jun., in North-western Victoria. I have a fine series obtained by Mr. McKeown on the leaves of another eucalyptus growing at Bomen, near Wagga, New South Wales. In the latter specimens the larvæ appear to have a habit of crawling to the tips of the long, slender leaves, where the adult sacs are clustered, or sometimes in a regular row on the side of the leaf. In specimens received from Mr. French the sacs are much more generally scattered over the leaves.

Adult female reddish brown; legs, antennæ and anal tubercles darker brown; elongate oval, slightly longer than broad. Antennæ six-jointed, first broad, second short, third longest, fourth and fifth short, latter longer than fourth, sixth as long as the fourth and fifth combined, elongate to the tip with scattered hairs. Legs well developed; tarsus long, with the digitules spatulate on tarsus, with another pair of hair-like digitules clubbed at the tips. Anal lobes short, stout, blunt, broad at the base; edges rounded to the tip: the inner parallel edges serrate, with a single spiny hair on either

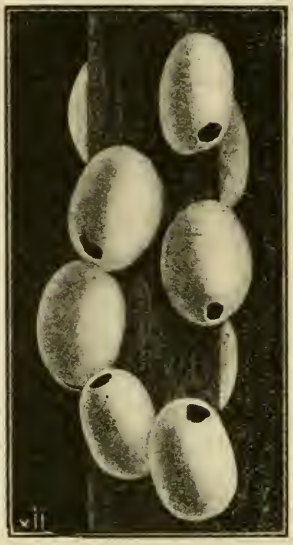

Fig. 62. *Eriococcus picta*, n.sp.

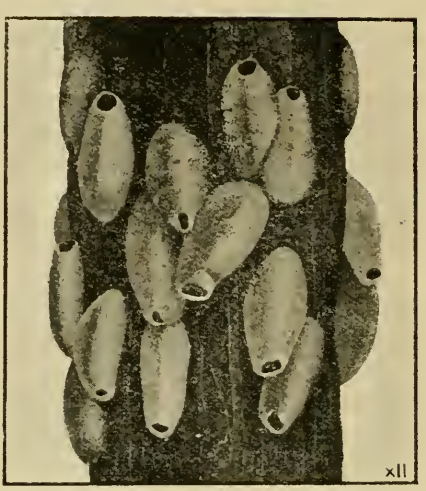

Fig. 64.—*Eriococcus tepperi*.

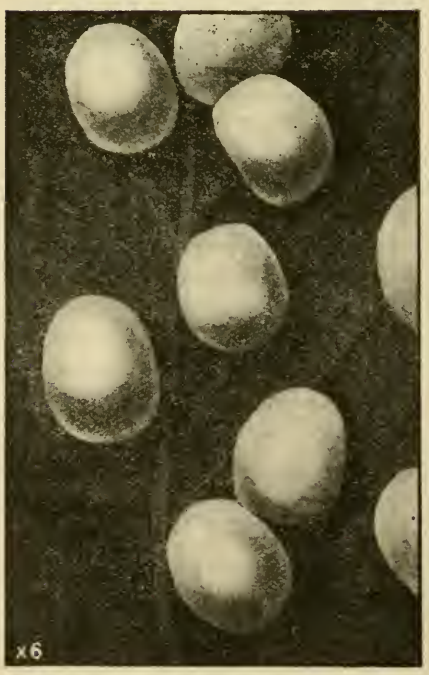

Fig. 63.—*Eriococcus serratilobis prominens*.

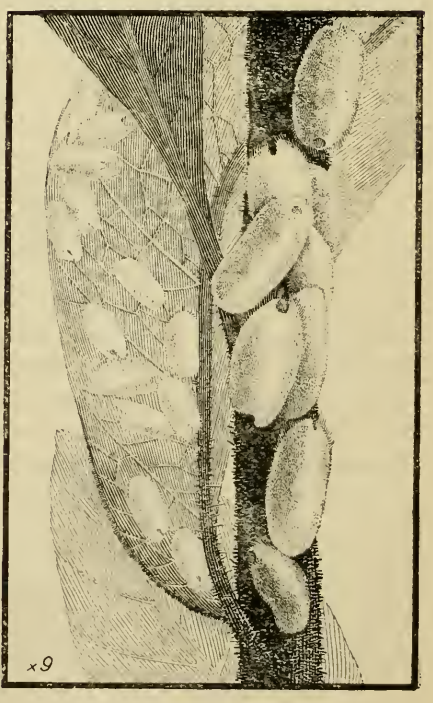

Fig. 65.—*Eriococcus villosa*, n.sp.

side, with anal setæ. Epidermis with a marginal ring of short blunt spines, with scattered circular orifices. An irregular dull yellow chitinous area apparently enclosing the anal ring. Length $\frac{1}{15}$ of an inch. Green says: "Length averaging 1·50 mm. Breadth 1·25 mm. Ovisac white, strongly convex, broadly oval, narrow behind, very closely felted and tough. Length, 3·0 to 3·50 mm. Breadth, 2·25 to 2·50 mm."

The Victorian specimens vary much in size, but are smaller than the Wagga specimens, which, though of the same form, have a decidedly yellow tint. Green, in the same paper, describes an *Ericoöccus* 1 obtained from Mr. E. P. Dodd, collected at Townsville, Queensland, on the leaves of an undetermined species of Eucalyptus, which has the same curious habit of congregating and forming the ovisacs at the extreme tip of the leaves. He describes it as a variety of the above species under the name of *Eriococcus serratilobis prominens* (Fig. 63). I think it could be well defined as a species. It differs from the type in the form of the anal lobes, which are more prominent and cylindrical, scarcely broader at the base than at the truncate extremity, contrasting strongly with the shorter and broadly conical lobes of the type; the chitinous plate narrower and more lunate in shape. The ovisacs on my co-type specimens are much smaller and more elongate.

Eriococcus simplex, Maskell.

Trans. New Zeaand Institute, vol. xxix, p. 317, pl. xxi, fig. 3. 1897.

The type specimens were sent from New South Wales to Maskell, but the exact locality is unrecorded, upon the foliage of *Eucalyptus*, sp.

The sac composed of yellow secretion, variable in form, convex, elliptical, about $\frac{1}{20}$ of an inch in length.

Adult female red, filling the sac when alive. Antennæ composed of seven joints, second and third joints longest. Feet normal. Anal ring with eight hairs. A row of short blunt, rather slender, spines on the outer margin of body, most numerous at the two extremities. Derm bearing other circular spinnerets.

Maskell says: "Allied to *Eriococcus spiniger*, but differs in the antennæ, the more slender spines, and their arrangement in terminal groups."

Eriococcus simplex var. *dealbata* was described from specimens sent from Western Australia, found on the young shoots growing from the butts of eucalyptus that had been cut down. It differs only in the sac being white, according to Maskell's description.

336. *Eriococcus simplex*. Cat. Coccidæ, p. 78.

Eriococcus sordidus, Green.

Victorian Naturalist, vol. xxi, p. 68, figs. 8–9. 1904.

This species was described from specimens found upon the foliage of the "Everlasting Flowers" (*Helichrysum ferrugineum*) growing on the Dandenong Ranges, Victoria, where Mr. C. French, jun., informed the writer it killed many of the plants.

The sac of the adult female is oblong oval, about 3 mm. in length. Green says: "Colour and texture difficult to determine, every example being thickly encrusted with black fumagine fungus, as is also the surrounding surface of the bark. The inner coating of the sac is white."

On the other hand, the male sac is snow-white, not affected by the fumagine, and about half the size of that of the female.

Adult female oval, colour not recorded. Antennæ seven-jointed, the second, third, fourth, and seventh longest. Anal tubercles stout, with short anal seta, with a long spine at the base of inner side, a slender one on outer side, and two slender ones at the apex. Anal ring with eight stout hairs. Derm with slender pointed marginal spines in sets of three, on the abdominal segments, paired spines on the back, reduced to a single pair on the abdominal segments, with a smaller single spine on each segment between the outer and inner ones. Both the dorsal and ventral surface of derm with spinnerets and fine hairs. Length, 1·25 to 1·75 mm.

Green says: "Differs from *E. danthoniæ*, Mask., in the broader form, shorter marginal spines, and the presence of a median dorsal series. Near *E. leptospermi*, Mask., but differing in the single marginal fringe and seven-jointed antennæ."

Eriococcus spiniger, Maskell.

Trans. New Zealand Institute, vol. xxviii, p. 398. 1896.
Froggatt, *Agric. Gazette New South Wales*, vol. xi, p. 105. 1900.

The type specimens collected upon the foliage of an undetermined species of Eucalyptus at Oatley, near Sydney, New South Wales.

The sac of the adult female convex, elongated and rounded at the extremities, composed close, felted; white filaments, fitting close down on the surface of the leaves. Length, about 1½ inches.

Adult female elongate oval, yellowish brown. Antennæ composed of six joints, of which the third and sixth are the longest. Legs slender, tibia a little shorter than tarsus; digitules fine hairs. Anal tubercles narrow, cylindrical, each bearing several short spines and long terminal setæ. The epidermis covered with many circular spinnerets and fine hairs: the margins are irregularly fringed with stout blunt spines, each segment of the cephalic area with fourteen to sixteen, and each abdominal segment with five on each side.

Sac of male coccid similar in form, but much smaller and more loosely felted.

337. *Eriococcus spiniger*. Cat. Coccidæ, p. 78.

Eriococcus tepperi, Maskell (Fig. 64).

Trans. New Zealand Institute, vol. xxiv, p. 29. 1891.
Froggatt, *Agric. Gazette, New South Wales*, vol. xi, p. 106. 1900.

This species was originally described from South Australia from specimens collected by Mr. Crawford upon *Eucalyptus globulus* and *Busaria spinosa*. It has a wide range, as it has been found in Tasmania on *Eucalyptus viminalis*

(Littler), and on the stems of *Eucalyptus*. sp.. Albury, New South Wales. The bark infested with this scale is usually cracked and roughened with a sugary secretion and some fumagine, the sacs often half buried in the roughened bark, and irregular in form.

Adult female sac dull yellow to dirty white, elongated, elliptical, sometimes segregated in masses, and irregular in form; composed of filaments compressed into a leathery consistency, with a large opening at the anal extremity. Length about $\frac{1}{4}$ of an inch, but varies considerably both in size and form.

Adult female dark red or brownish, elongate oval, tapering to the extremity, sub-globular. About $\frac{1}{16}$ of an inch in length. Antennæ composed of six joints, the first three subequal, the third slightly longest, but all much longer than the fourth and fifth, the sixth rather short. Legs slender, tarsus nearly twice as long as the tibia. Anal ring with eight hairs. No marginal spines, but each segment bearing a transverse row of fine spines. Epidermis bearing a number of small circular orifices.

Maskel says: "Allied to the New Zealand *E. pallidus*, but is smaller, and also differs in the size and structure of the antennæ."

338. *Eriococcus tepperi*. Cat. Coccidæ, p. 79.

Eriococcus tesselatus, n.sp.

The adult females cover the bark of the young branches and twigs with their sacs. causing the bark to become cracked, discoloured, and covered with a slight waxy secretion. Specimens obtained from Parkes and Manly, New South Wales. on undetermined species of *Eucalyptus*.

Sac of adult female elongate, irregular in form, often half buried in a crack in the surface of the bark, comprised of cottony filaments closely matted together with a waxy secretion that makes them brittle and easily broken; dull white to a brown or yellowish tint. Length variable, but usually about $\frac{1}{16}$ of an inch.

Adult female bright red, rounded, oval; segmental divisions distinct, with the abdominal ones tapering to a point at the extremity. Length about $\frac{1}{25}$ of an inch. Antennæ seven-jointed, second and third long, seventh longer than the sixth, with tuft of fine hairs at extremity. Legs well developed but slender; tibia short, tarsus long, claw long and slender digitules, long hairs slightly dilated at the tips. Anal tubercles short, stout, and rounded at the tip, with a long seta produced from the centre of the tip, with a short one on the outer side and other spines at the base. Anal ring with eight or more hairs, forming a regular brush at the tip of the abdomen and extending beyond the anal tubercles, forming a regular tail between them. The epidermis covered with scattered small semi-transpatent spines and circular orifices, with the dorsal surface of the

abdominal segments covered with fine, dark, irregular oval areas, forming a fine tessellation of the surface in bands between the segmental divisions, and also covering the lower portion of the anal tubercles. The sacs look like those of *Eriococcus tepperi*, but the examination of the enclosed female coccid shows that it is a very distinct species.

Eriococcus tricarinatus, Fuller.

Journal West Australian Bureau of Agriculture, p. 1345. 1897.
Trans. Ent. Soc., London, p. 442, pl. xv, figs. 6, 6a. 1899.

The type specimens were found upon the galls of *Maskellia globosa* growing upon *Eucalyptus gomphocephales*, Western Australia.

The sac of the adult female white, elongate, oval, tapering behind with three longitudinal ridges down the centre and sides, with a small circular orifice at the apex. Length, 0·08 inch.

Adult female dark brown, convex on summit, tapering to the extremity.

Antennæ composed of seven joints, the apical one longest. Legs slender. Anal tubercles cylindrical, furnished with five setæ, three near the base and two at the apex. Anal ring with eight rather flat hairs. Legs: tarsus as long as tibia, upper digitules knobbed, lower digitules dilated.

Eriococcus villosa, n.sp. (Fig. 65).

The insects were collected on the twigs of the native blackthorn (*Busaria spinosa*), growing on the banks of the Clarence River, near Grafton, New South Wales.

Sac of adult female elongate oval, rounded and slightly depressed at the extremities, and sometimes slightly constricted at the tip; the anal aperature circular, well defined, well up from the margin. Formed of closely-felted cottony filaments, which have a distinct transverse segmentation, the surface clothed with a fine down of silvery hairs which almost form a fringe at the extremities in perfect specimens. Longer than broad, $\frac{1}{8}$ of an inch in length.

Adult female dull yellowish brown, broadly rounded. Length about $\frac{1}{10}$ of an inch. Antennæ composee of seven joints– the first broad, second short, fourth narrow, fifth shortest, sixth a little longer with stout spiny hair on outer margin, seventh rounded with spiny hair on the side, and finer hairs at the tip. Legs normal. Anal tubercles short, broad at the base, but about two-thirds from the base the inner margin is deeply arcuate, with a short stout spine standing out on the angle, with a long central seta at the rounded tip above. Anal ring with apparently eight flattened hairs. Epidermis thickly covered with short angular semi-transpatent spines.

This is another form allied to *Eriococcus eucalypti* with the epidermis covered with short thorn-like spines, but the differences in the form and structure of the sac, and the points in the anatomy of the female coccid, give it specific rank.

Genus XXXIV. *Pseudoripersia*, Cockerell.

Check List Supplement, p. 392, footnote. 1899.
Canadian Entomologist, vol. xxxi. p. 27[illegible]. 1899.

The species that represents this genus was originally described by Maskell under the name of *Eriococcus turgipes*, but, doubtful of its exact position, he afterwards placed it in the genus *Ripersia*, and also suggested it might be placed in the genus *Gossyparia*. It should certainly be removed from these genera, and I have therefore adopted Cockerell's genus, though he has simply defined it, "Legs extremely thick, like crab's claws."

Maskell in his original description gives the following details of the unique species that represents the genus: "Adult female enclosed in a leathery sac with an opening in the centre of the dorsal surface. Antennæ composed of six joints. General form circular, with the stout short aborted legs standing out round the margin. Anal tubercles very small; anal ring compound, with six hairs. The outline of the insect being circular, the six feet are placed at equal distances, so that the anterior pair are in front of the rostrum, and the posterior pair very far towards the anal tubercles."

Fig. 66.—*Pseudoripersia turgipes*.

Pseudoripersia turgipes, Maskell (fig. 66).

Eriococcus turgipes, Mask., *Trans. N. Zealand Institute*, vol. xxv. p. 228, pl. xiv. figs. 15–20. 1892.

Ripersia turgipes, Mask., *Trans. N. Zealand Institute*, vol. xxix. p. 318. 1896.

Eriococcus turgipes, Froggatt, *Agric. Gazette N. S. Wales*, p. 106, pl. i, fig. 1. 1900.

The sacs of the adult females are attached to the slender branchlets of the she-oak (*Casuarina suberosa*), and are common in the neighbourhood of Sydney, New South Wales; sometimes single ones stand out like little white cocoons, but when numerous their presence causes the slender branchlets of the she-oak to become aborted, often curling right round the coccid sac, so that it forms a cluster of knotted branchlets over the tips of the infested foliage.

Sac of adult female formed of white leathery secretion, almost globular, with a more or less round opening in the centre of the back, and on the underside a narrow slit where it is attached to the plant. Height, $\frac{1}{10}$ of an inch; length, $\frac{1}{8}$ of an inch; but variable both in size and form through compression by the branchlets.

Adult female almost black, nearly globular, but flattened on the dorsal surface; the feet aborted into short thickened processes quite unlike those of the *Eriococcus*; the tibia, tarsus, and claw fused into one, with no digitules. Anal tubercules very small, with one terminal seta, and a number of short conical spines at the base: anal ring with six hairs. Epidermis covered with fine short hairs, circular orifices, and short conical spines.

551. *Pseudoripersia turgipes*. Cat. Coccidæ, p. 115.

Genus XXXV. *Erium*, Crawford.

Maskell and Crawford, *Trans. N. Zealand Institute*, vol. xxiv, p. 34. 1891.

Cockerell, *American Naturalist*, vol. xxxi, p. 590. 1897.

Cockerell, *Canadian Entomologist*, vol. xxxi, p. 278. 1899.

The species upon which this genus is founded was originally collected by Mr. Crawford, of Adelaide, South Australia, who gave it the MS. name of *Erium globosum*, but did not describe it. Maskell, though somewhat doubtful of its affinities, dropped Crawford's new genus and placed it in the genus *Dactylopius*. Cockerell, studying the species, took it as the type of Crawford's discarded genus, and included a number of Mexican species. According to Newstead's description of *Dactylopius hibernicus* (*British Coccidæ*, vol. ii, p. 172), a rare species found upon grass, it probably comes into this genus.

Fig. 67. *Erium frenellæ*.

In general form and structure the adult female is closely allied to that of the genus *Dactylopius*, the differences being that the joints of the antennæ are more regular in form, with the last joint often distinctly rounded and of a uniform shape. The legs are short and thickset. In most species the anal lobes are very small with a number of spines of a lance-headed form. The whole of the epidermis covered with circular orifices, many short rod-like processes, and short spines or hairs.

The adult female is completely enveloped in a mass of fine felted woolly filaments or mealy secretion, forming a complete sac protecting the female and larvæ.

Erium frenellæ, n.sp. (Fig. 67.)

Clustering over the foliage of the desert cypress (*Frenella robusta*) collected at Wagga-Dubbo, and other localities in the western parts of New South Wales, probably ranging over a large area with its food-plant, this species was determined by Mr. E. E. Green.

The adult female is enclosed in an elongate oval white sac, convex, but sloping to the extremities; sac composed of rather brittle white waxy secretion, like soft eggshell, under which is the female and a compact mass of larvæ. Length of sac, $\frac{1}{4}$ of an inch. Adult female, yellowish brown.

broadly oval. Length, $\frac{1}{8}$ of an inch. Legs short, stout, claw with fine hairs. Antennæ composed of seven joints, the second shorter than the third and fourth; fifth and sixth shorter than the fourth; the seventh longest; contracted and irregular in form, tufted with fine hairs. Anal tubercles very indistinct; anal ring small with six fine hairs. Epidermis thickly covered with short rod-like processes, small circular orifices, and towards the abdomen with many fine hairs, thickest at the extremity.

Erium globosum, Maskell (Fig. 68).

Dactylopius globosus, *Trans. N. Zealand Inst.*, vol. xxiv, p. 34, pl. vii, figs. 6–8. 1891.
" " Newstead, *Ent. Monthly Mag.*, vol. xxxi, p. 167. 1895.
Erium globosum, Cockerell, *American Naturalist*, vol. xxxi, p. 590. 1895.
" " Cockerell, *Canadian Entomologist*, vol. xxxi, p. 278. 1899.

Originally described from specimens found upon the foliage of the thorny acacia (*Acacia armata*) near Adelaide, South Australia. Mr. Crawford sent the type to New Zealand with the MS. name of *Erium globosum*, but Maskell described it in the genus *Dactylopius*. In Victoria it is recorded upon *Acacia decurrens*, but in the coastal districts of New South Wales it is very common on the foliage of *Grevillea buxifolia*.

The adult female is enveloped in a complete rounded sac of white woolly filaments, loosely felted together, usually resting on the axil of the leaf. Diameter, up to $\frac{1}{4}$ of an inch. Adult female globular, dark purple to almost black in tints. Length, about $\frac{1}{8}$ of an inch. Antennæ composed of seven joints (Maskell says sometimes eight); first joint short, broad; second and fourth shorter than the third, but the fifth and sixth still shorter; the seventh longest, rounded at the tip, with a few hairs. Legs small, but stout in proportion to the length. Anal ring large, with six long hairs. Anal tubercles very small, with short lance-headed spines at the tip, and a few below. Epidermis covered with short rod-like processes, small circular spinneret orifices, and fine hairs.

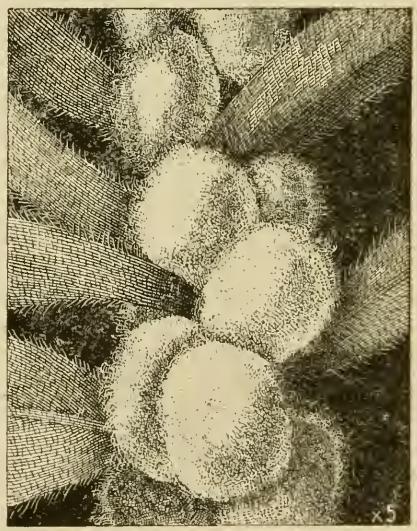

Fig. 68. *Erium globosum*.

540. *Erium globosum*. Cat. Coccidæ, p. 113.

Erium newmani, n.sp.

This species comes from Darlington, Western Australia, where Mr. L. J. Newman collected it on the foliage of an undetermined species of *Grevillea*. It is allied to *E. globosum*, having a similar cottony covering, but it is much larger and differs in several characters. It does not agree with Fuller's description of *Dactylopus grevilleæ*, though that species should probably be included in the genus *Erium*.

Adult female subglobular, dull purple. Length, $\frac{1}{3}$ of an inch, including the cottony sac. Antennæ composed of eight joints; first and second short, broad; second and third of equal length and almost looking like a single joint; fourth shortest; sixth narrow at base; eighth longer than sixth and seventh combined, cylindrical and broadly rounded at the extremity. Legs very short and broad in proportion to their length. In some specimens the antennæ are variable, only seven joints can be defined, and the fifth is smallest. Anal tubercles very indistinct, no lance-head spines can be seen, but isolated ones are present. Anal ring well defined with six long hairs. Epidermis thickly covered with small circular spinneret orifices, and short rod-like processes with a few hairs.

Genus XXXVI. *Dactylopius*, Costa.

Fauna del Regno di Napoli Coccinigl. p. 15. 1835.
Maskell, *Scale Insects of New Zealand*, p. 99. 1887.
Newstead, *Mon. British Coccidæ*, vol. ii. p. 162. 1902.

This genus contains a number of coccids of moderate size, popularly known as "mealy bugs." Up to the time of egg-laying they are active, oval, flattened little creatures with well-developed legs and antennæ, usually covered with fine white meal or short woolly filaments, more or less hiding the structure and colour of the insect, and frequently forming a fringe round the margins. Often swarming over the young foliage in countless numbers, they congregate together, aborting and twisting up the twigs and young foliage by their presence. In the gravid or adult stage they become covered with a mass of cottony secretion, resting upon a pad, or forming an ovisac after the manner of the members of the genus *Pulvinaria*.

Newstead defines the generic characters as follows:- "Adult female with eight-jointed antennæ, the last joint being invariably longer than the penultimate (7th), mentum biarticulate; legs persistent; anal lobes small or rudimentary; anal orifice with six hairs. Male abdomen with two long white caudal filaments; genitalia short, male puparium felted.

Maskell says: "Adult female having antennæ of eight joints, anogenital ring with six hairs. Naked or more or less usually covered with mealy or cottony secretion. Male pupa enclosed in a cottony sac."

About fifteen species have been described or recorded from Australia, several of which are cosmopolitan.

In Mrs. Fernald's catalogue only four species are left in this genus, of which *Dactylopus* (*Coccus*) *cacti* is made the type. All the Australian species are placed in Westwood's genus *Pseudococcus*, the members of which differ only from the coccids in this group in the possession of nine joints in the antennæ. All the Australian mealy bugs that I have examined or that have been described from Australia have seven or eight joints in their antennæ, with the exception of the three placed in *Pseudococcus*, while *Dactylopius longispinus*, which she makes the type of *Pseudococcus*, has only eight joints instead of nine in its antennæ. I therefore retain all those with less than nine joints in the antennæ in this genus.

Dactylopius acaciæ, Maskell.

Trans. N. Zealand Institute, vol. xxiv, p. 33, pl. vi, figs. 15–16. 1896.

This species infests the twigs and foliage of *Acacia linearis* and *Albizzia lophantha*, growing near Melbourne, Victoria.

Adult female varying in colour from dark purple to dull black, enveloped in white cottony secretion forming masses on the twigs. Antennæ long, composed of seven joints subequal, except the seventh, which is longer and

fusiform. Legs long, stout, with fine hairs. Anal tubercles with two smaller lobules on either side, all bearing short, strong spines, and the median tubercles a long seta. Epidermis covered with many spinneret orifices, together with spines and long fine hairs; anal ring with six hairs. Length, about $\frac{1}{25}$ of an inch.

Maskell says: "Allied to *Dactylopius hibbertiæ* and *D. albizziæ*: but the six abdominal lobules and the antennæ and feet separate it from the latter species."

439. *Pseudococcus acaciæ*. Cat. Coccidæ, p. 97.

Dactylopius affinis, Maskell.

Trans. N. Zealand Institute, vol. xxvi, p. 90, pl. viii, figs. 17–18. 1893.

This mealy bug is a subterranean species found upon the roots of dahlias and potatoes in the neighbourhood of Sydney, New South Wales.

Adult female, pinkish to yellowish, powdered with thin white meal on the dorsal surface. Form elliptical, somewhat flattened, segmental divisions distinct. Length, up to $\frac{1}{8}$ of an inch. Coccid fringed on the sides with woolly filaments shortest in front, longest behind. Antennæ composed of eight segments, the last longest; then the third, second, and first; fourth, sixth, and seventh shortest and equal to each other; fifth longer than the fourth and nearly as long as the first. Feet long, slender, pubescent; tarsus short; epidermis bearing a number of small circular spinnerets and a few minute scattered hairs. Anal ring with six hairs. Anal lobes small, bearing hairs and several glandular pores.

Maskell says it is allied to a number of species of the *Dactylopius adonidum* type, but its subterranean habits, and the structure of its feet and antennæ separate it from those.

440. *Pseudococcus affinis*. Cat. Coccidæ, p. 97.

Dactylopius albizziæ, Maskell.

Trans. N. Zealand Institute, vol. xxiv, p. 31, pl. vi, figs. 3–10. 1891.
Froggatt, *Agric. Gazette New South Wales*, vol. xiii, p. 719, pl. 114, fig. 17. 1902.
Kirkaldy, *Fauna Hawaiensis*, vol. iii, pl. ii, p. 103. 1902.

The original specimens were sent from Victoria upon *Albizzia lophantha;* it is, however, a very common scale in the coastal districts of New South Wales upon the small shrubby acacia, *Acacia discolor*. In the plantations of *Acacia decurrens* in the South Coast districts it often does a great deal of damage to the young trees, and is also recorded upon several other species of acacias. Kirkaldy has recorded it upon an orange in the Hawaiian Islands.

Adult females massed together upon the twigs and main branchlets: the oval convex, purplish black coccids almost touching, resting upon a white woolly pad, which forms a rim round the margin; and the mealy secretion is

often irregularly scattered over the dorsal surface, forming slight transverse bands. The dorsal surface is distinctly segmented; antennæ varying from seven to eight joints, last one longest. Legs slender, normal; tibia very slightly dilated at the extremity, with long fine hairs; lower pair slightly thickened. Anal tubercles very small, each bearing a seta; anal ring with six hairs. Epidermis covered with small circular spinnerets and a few slender spiny hairs.

Length, $\frac{1}{6}$ of an inch (Maskell gives much smaller dimensions).

442. *Pseudococcus albizziæ*. Cat. Coccidæ, p. 97.

Dactylopius aurilanatus, Maskell (Figs. 69 and 70).

Trans. N. Zealand Institute, vol. xxii, p. 151, pl. viii, figs. 7–18. 1889.
Trans. N. Zealand Institute, vol. xxix, p. 320. 1896.
Craw, *Fifth Bien. Report, Californian Board Horticulture*, p. 45. 1896.
Froggatt, *Agric. Gazette New South Wales*, vol. viii, p. 531. 1897.
Fuller, *First Report Entomologist Natal Dep. Agric.*, 1899–1900, p. 106.

This is the common mealy bug of the stone pines, *Araucaria bidwelli* and *A. excelsa* in New Zealand, and it was probably introduced with nursery stock into California, Natal, and Australia on these trees.

In nearly all the parks and gardens where these pine trees are grown this scale will be found, sometimes covering all the trunk and branchlets. When it attacks young trees it often kills them right back, but on large trees the coccinellid beetles, lacewings and their larvæ soon clear them off in spite of their numbers.

Adult female, deep purple black, resting upon a mass or pad of woolly secretion, with the outer margin fringed with bright yellow floury secretion, that also forms a dorsal stripe down the centre of the back. General form, broadly rounded, convex, with distinct irregular segmental corrugations. Antennæ seven or eight jointed. Legs normal; the upper digitules long, fine, knobbed hairs, lower one slender with dilated ends. Anal tubercles small; anal ring with six hairs. Epidermis with scattered spinnerets, with short fine spiny tubes among them. Length, $\frac{1}{10}$ of an inch.

446. *Pseudococcus aurilanatus*. Cat. Coccidæ, p. 97.

Dactylopius australiensis, Green and Lidgett.

Victorian Naturalist, vol. xvii, p. 13. 1900.

These coccids were found upon the foliage of *Acacia dealbata* at Myrniong, Victoria. Recorded as a serious pest on these wattles.

"Adult female partly enclosed in a mass of pure white cotton; subglobular in shape, deeply and distinctly segmented. Antennæ irregular, composed o seven or eight joints; the variation is caused through the division between the fourth and fifth being often confluent. Anal ring with six stout hairs Digitules fine knobbed hairs, those on tarsus longest; tarsus very short

Fig. 69.—*Dactylopius aurilanatus* on trunk of tree.

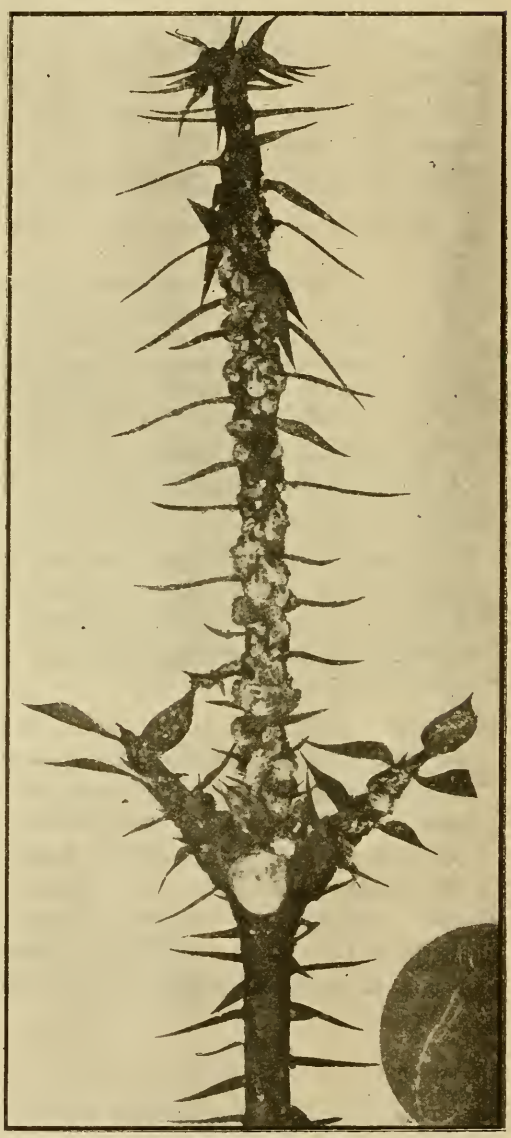

Fig. 70.—*Dactylopius aurilanatus* on a seedling pine killed by the scab.

about one-third the length of the tibia; the tibia rather less than three-quarter of the length of femur and trochanter together. Length of coccid, 2·50 mm."

The authors give a sketch of the different forms of the antennæ, and state that this species is allied to *Dactylopius globosus* (Mask.), but differs in the test, being much slighter in the structure of the legs and in the smaller size of the adult insect.

447. *Pseudococcus australiensis*. Cat. Coccidæ, p. 98.

Dactylopius bromeliæ, Bouché.

Lecanium bromeliæ, Bouché Schädl, *Gart. Insects*, p. 49. 1833.
Aspidiotus bromeliæ, Bouché, *Stett. Ent., Zeit.*, vol. v, p. 295. 1844.
Dactylopius bromeliæ, Sign., *Ann. Soc. Ent., France*, vol. v, p. 310, 1875; p. 610, 1876.
" " Maskell, *Trans. N. Zealand Institute*, vol. xxvi, p. 88. 1893.
" " Tryon, *Queensland Agricultural Journal*, vol. viii, p. 297. 1901.

This is the Bromelia or pineapple scale common in many parts of the world on those plants, and also recorded upon mulberry, canna, and hibiscus. Recorded from India, Africa, North and South America, and Grafton, New South Wales.

The adult female coccids are red, ellipitcal, slightly convex, measuring about $\frac{1}{12}$ of an inch in length, coated with a white floury secretion, through which the segmental lines can be traced; the fringe of more flocculent matter irregular and slight round the front and side margins, but on the anal segment produced into a row of about eight white tails of equal length.

Antennæ, as described by Maskell, eight-jointed, the last longest. Legs long, with nobbed digitules. Epidermis with circular spinnerets and spiny hairs. Anal tubercles very small with long setæ. Anal ring compound, with eight long hairs.

The coccids crawl all over the base of the pineapple fruits, and are massed together in the inequalities on its surface.

450. *Pseudococcus bromeliæ*. Cat. Coccidæ, p. 98.

Dactylopius candidus, n.sp. .

This is a common coccid upon the foliage of the black wattle (*Acacia decurrens*), growing in the coastal districts in the neighbourhood of Sydney. The insects attack the young branchlets, twisting and aborting them, while the adult female works along the under-surface of the midrib of the leaves, covering them with woolly white secretion, upon which she lays her eggs. In the earlier stages of development they move about among the branchlets, often so abundantly that the whole bush is covered with white filaments. This species is allied to Maskell's *Dactylopius acaciæ*, but differs from it in not forming masses of woolly secretion, but living free upon the surface of a flattened mass; also in the structure of the antennæ and anal tubercles.

Adult female black, lightly covered with mealy wax, oval, rounded, segmental divisions well defined, under-surface flattened. Length, $\frac{1}{8}$ of an inch. Antennæ eight-jointed, the last two (if distinct segments) broadly rounded and much longer than the sixth and fifth combined; first short, broad; third slightly longer than the fourth and fifth. Legs long, femora stout, tibia slender, tarsus fine, curved in at the tip. Anal tubercles very small with one long spiny hair and half a dozen shorter ones. Epidermis very thickly covered with circular spinneret orifices, and stout hair-like spines springing from distinct tubercles.

Dactylopius ericocola, Maskell.

Trans. N. Zealand Institute, vol. xxv, p. 232, pl. xv, figs. 10–11.. 1892.

This scale was found upon an introduced plant, one of the African heaths (*Erica autumnalis*), at Melbourne, Victoria. It may therefore not be a native of Australia. I have no other record of the species. It generally secretes so much honey-dew that all the foliage of the infested plant becomes smothered with fumagine; the type specimens were also heavily parasitised by chalcid wasps.

Adult female varying in colour from dark brown to red; general form subglobular; aggregated masses of dirty white cotton surrounding but not covering the coccid. Length of coccid, $\frac{1}{20}$ of an inch. Antennæ consisting of seven joints, last one longest. Feet moderate; digitules fine hairs. Anal tubercles very small; anal ring with six hairs. Epidermis very finely wrinkled, bearing spinnerets and conical spines.

Maskell further says: "It comes nearest to *Dactylopius globosus* (Mask.) from which it differs in not being covered by its cotton, and in the characters of the epidermis."

465. *Pseudococcus ericicola*. Cat. Coccidæ, p. 101.

Dactylopius grevilleæ, Fuller.

Trans. Ent. Soc., London, p. 454, vol. xv. 1899.

A species found upon the foliage of *Grevillea bipinnatifida* at Swan River, Western Australia.

Adult female stationary, subglobular, distinctly segmented, lightly covered with mealy secretion, and enclosed in an almost perfect spherical sac. General colour, purplish black; antennæ seven-jointed. Legs short and stout. Epidermis with many spinnerets and small spines; tubercles small, each with one long spine and four smaller ones; similar spines on the sides of each segment, and a row across the back. Anal ring with six short hairs. Size not given by Fuller.

474. *Pseudococcus grevilleæ*. Cat. Coccidæ, p. 102.

Dactylopius herbicola, Maskell.

Agricultural Gazette New South Wales, vol. ii, p. 352, 1891 (woodcut figs. 1–7). Cockerell, *Ann. and Mag. Nat. Hist.* (6), vol. xvi, p. 134. 1895.

This species was described by Mr. Maskell from specimens sent to him by Mr. Olliff; they were found upon grass (*Aristida ragans*) growing at Mulgoa, near Penrith, New South Wales. In Maskell's description and figures he defines a strap or band of white secretion standing up like a flat handle across the centre of the insect, with the secretion flattened down at the front and hind portion. I have never been able to find a coccid upon grass with this form of test, and it may be something abnormal.

Maskell says: "Adult female dark brownish purple, slightly elongated, convex above, flat beneath, covered with thin white meal, and sometimes bearing several long curling very fine threads, resting on a cushion of white cottony secretion, which seems usually to be a good deal longer than the body. From this cushion, in all the specimens observed, rises a band of cotton arching over the dorsum of the insect like a strap, as if to keep it in place. This band never appears to be wide enough to enclose the insect entirely." If this test is the normal structure, this coccid is a very rare species, and I have never seen it.

Adult female, $\frac{1}{9}$ of an inch in length. Antennæ with seven or eight joints; feet with hairs on the inner margins; digitules with four fine knobbed hairs; claw short and thick; derm with many spinnerets and fine spiny hairs.

I have specimens of a *Dactylopius* found upon the same species of grass in the neighbourhood of Sydney, collected by Mr. E. Zeck, which is identical or closely allied to this species, as far as the structure, form, and colour of the adult female coccid as described by Maskell are concerned. The form of the woolly secretion, however, is very different. The adult coccid resting upon the grass stem is enveloped in an elongate mass of lightly felted filaments, which are broadest in the centre and taper away at both extremities, measuring up to $\frac{1}{3}$ of an inch in length. This may be the normal form of the woolly covering.

476. *Pseudococcus herbicola*. Cat. Coccidæ, p. 103.

Dactylopius hibbertiæ, Maskell.

Trans. N. Zealand Institute, vol. xxiv, p. 32, pl. vi, figs. 11–14. 1891. Cockerell, *Ann. and Mag. Nat. History* (6), vol. xvi, p. 134. 1895.

The type specimens were collected in South Australia upon the foliage of *Hibbertia linearis* and *H. virgata*.

Adult female, dark purple, subglobular, showing regular segmentation; $\frac{1}{16}$ of an inch. Resting upon a pad of yellow cotton, with the dorsal surface covered with a similar secretion, but not covering the edges of the pad under-

neath. Antennæ seven or eight joints; feet short and thick; anal tubercles very small; anal ring with six hairs. Epidermis covered with small spiny hairs and small circular spinneret orifices.

Maskell says: "This insect differs from *D. albizziæ* in the character of the cottony cushion and upper covering, and also in the form of the feet and antennæ of the adult female and other minute characters. It would seem that the upper cottony mass falls off at gestation, leaving the insect shrivelling up in the cup formed by the lower cushion.

477. *Pseudococcus hibbertiæ*. Cat. Coccidæ, p. 103.

Dactylopius hilli, n.sp.

Found upon the upper and underside of the leaves of a wattle (*Acacia*, sp.). at Darwin, Northern Territory, by Mr. G. F. Hill; the female coccids congregated together in clusters and protected by the green tree-ants (*Oecophylla smaragdina*).

Adult female, pale brownish yellow, covered with white mealy secretion and fringed with fine pencils of woolly matter, short on the cephalic portion, but on the abdominal segments increasing in length until the terminal anal pair, which are close together at the base, stand out as long as the whole coccid. Length, without anal tails, about $\frac{1}{12}$ of an inch. General form broadly oval, dorsal surface flattened. Antennæ eight-jointed; first shorter and broader than the second and third, which are the longest, and of about equal length; fourth and fifth rather more slender, of equal lengths; sixth and seventh somewhat broader, but slightly shorter; eighth as long as the last two combined. Legs long with a spine at tip of tarsus above the claw. Anal tubercle distinct, rounded, bearing one long hair, one stout short spine and about eight hairs, with a group of spinnerets and hairs behind the anal ring, which has six long hairs. Behind the anal ring is a curious process appearing to have a central ridge with radiating lines on either side forming an oval area.

This species appears to come near *Dactylopius citri*, Risso, but differs in the form of the antennæ, anal tubercles, and the woolly filaments.

Dactylopius lanigerus, Fuller.

Journal West Australian Bureau of Agriculture, vol. iv, p. 1345. 1897.
Trans. Ent. Soc., London, p. 454. 1899.

Found upon *Acacia pulchella* in Western Australia, where it is locally known as the "snow scale."

Adult females move about slowly, clustering together on the branches and secreting great quantities of woolly filaments, which, matted together, hang down in shreds from the twigs. Colour of female yellowish to dull brown, with short tassels of cotton on each segment; antennæ eight-jointed; anal ring with eight hairs. Length, 0·9 inch.

485. *Pseudococcus lanigerus*. Cat. Coccidæ, p. 104.

Dactylopius lobulatus, Maskell (Fig. 71).

Trans. N. Zealand Institute, vol. xxv, p. 91, pl. vi, figs. 1–3. 1893.

The adult females are found under the scales of dry bark peeling off the trunks of several species of the white gums (*Eucalypts*). The type specimens were found upon the stems of blue gums (*E. globulus*) growing in the streets of Bendigo, Victoria. They were very plentiful at Uralla, New South Wales, in July, on white gums, and apparently have a wide range in the eastern States. Sometimes they are found on the stems of small saplings covered over and protected by ants.

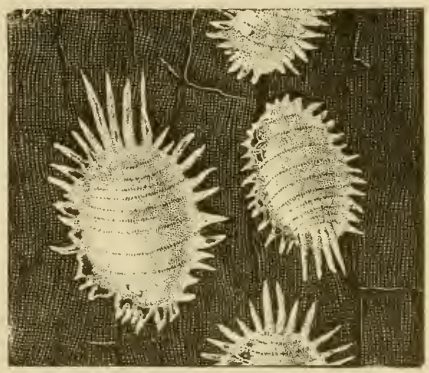

Fig. 71.—*Dactylopius lobulatus.*

Adult female yellowish brown with the dorsal surface completely covered with white woolly secretion, forming distinct transverse bands (marking the segmentation); narrowest on the abdomen, produced into an unbroken marginal fringe right round the insect, irregular in front, regular on the sides, and upon the anal segment forming longer blunt tails. Including the tails, often measuring up to $\frac{1}{3}$ of an inch in length. General form, elongate broadly oval, slightly convex above, with the segmentation well defined; anal segment somewhat truncated with four lobes; anal ring with six hairs. Epidermis with many small circular spinnerets and fine spines, most numerous on the margins. Antennæ composed of eight joints, first one stout and thickened; feet long; femora stout; trochanter bearing one long hair.

Maskell gives the size as much smaller than that of the large series of adult specimens I have had under observation. He says: "This insect belongs to the series of *D. adonidum* and may be distinguished from that species and from *D. affinis* chiefly by the proportion of the antennal joints, and by the anal tubercles."

489. *Pseudococcus lobulatus*. Cat. Coccidæ, p. 10.

Dactylopius longispinus, Targioni-Tozzetti.

Mem. del Societa. Ital. di Scienze Nat., vol. iii, p. 113. 1867.
Newstead, *Mon. British Coccidæ*, vol. ii, p. 167, pl. lxiv, figs. 12–15. 1902.
Dactylopius adonidum, Signoret, *Ann. Soc. Ent., France* (5), vol. v, p. 306. 1875.
„ *longifilis*, Coms. *Report U.S. Dep. Agric.*, 1880, p. 344, pl. xxviii, fig. 2.

This is a common mealy bug of the hothouses of Europe; it has been widely distributed over most parts of the world with introduced plants. Under all conditions of climate, it flourishes upon mango, fig, guava, crotons,

and other tropical fruits, as well as those in the warmth of the hothouse. Maskell has recorded it upon *Acacia longifolia* from specimens sent to him from New South Wales under the name of *D. adonidum*, under which name it has usually been recorded by Australian entomologists. I have recently had thistle stems covered with adults and larvæ.

Newstead says: "Adult female elongate, oval, covered with white mealy wax except on the articulation of the segments, where the colour of the body shows through; fringed with white waxy appendages, the outer caudal ones often longer than the whole insect. Antennæ, eight-jointed; third, fourth, and eighth longest. Anal lobes faintly indicated, each with one long and two minute hairs, and a ventral group of spinnerets surrounding two short spines. Anal orifice with six rather long hairs. Length, 3-4 mm."

This mealy bug can generally be recognised from the great length of the two waxy woolly anal filaments, usually only slightly longer than the other filaments in allied species like *D. lobulatus*.

490. *Pseudococcus longispinus*. Cat. Coccidæ, p. 104.

Dactylopius macrozamiæ, Fuller.

Journal West Australia Bureau of Agriculture, vol. iv, p. 1346. 1897.
Trans. Ent. Soc., London, p. 454. 1899.

Found at the base of the fronds of *Macrozamia frazieri* at Swan River, Western Australia.

Adult female light brownish yellow, elongate, flattened, segmented, with the dorsal surface clothed with white mealy secretion. Antennæ eight-jointed; feet simple, spined; tubercles small; anal ring conspicuous with six hairs; dorsum clothed with many fine hairs and raised spinnerets. Length, 0·16 inch.

492. *Pseudococcus macrozamiæ*. Cat. Coccidæ, p. 106.

Dactylopius similans, Lidgett.

The Wombat, vol. iii, No. 4, p. 91, pl. i, figs. 1–5. 1898.

This species was described from specimens found upon the roots of a daphne at Myrniong, Victoria.

I am informed that the type is lost; according to the author's description it is so closely related to Maskell's subterranean species (*Dactylopius affinis*) that it is very difficult to see upon what the specific differences are founded. He says: "Differs in the granular character of the mealy or cottony secretion; is larger, and the long single projecting fringe is sufficient to separate it."

520. *Pseudococcus similans*. Cat. Coccidæ, p. 109.

Dactylopius zamiæ, Lucas.

Bulletin, Ent. Soc., France, vol. v, p. cvii. 1855.
Boisduval, *Entomologie Horticole*, p. 357. 1867.
Signoret, *Ann. Soc. Ent., France*, vol. v, p. 328.

This species was described by Lucas upon a specimen of *Zamia spiralis*, a native of New South Wales and Queensland, sent to France. The insects were very plentiful upon the fronds.

The adult female is described by Signoret as of the usual typical flattened oval form, yellowish brown in colour, very active, covered with white floury secretion, with the usual marginal and anal fringe. Measuring up to 5 mm. in length.

537. *Pseudococcus zamiæ*. Cat. Coccidæ, p. 112.

Genus XXXVII. *Pseudococcus*, Signoret.

Ann. Soc. Ent., France (5), vol. v, p. 329. 1875.
Comstock, *U.S. Dep. Agric. Report*, 1880, p. 345.
Newstead, *Mon. British Coccidæ*, vol. ii, p. 176. 1903.
Phenacoccus, Cockerell, *Ent. News*, vol. iv, p. 318. 1893.
Paroudablis, Cockerell, *The Entomologist*, vol. xxxiii, p. 87. 1900.

The members of this genus are closely related to those of the preceding one. The adult female is a dactylopid coccid with nine-jointed antennæ. The male coccid is furnished with four caudal filaments instead of two, but there is no apparent difference in the larval forms of the two genera. Newstead says: "In the majority of the species the ovisac is very elongated, and composed of white felted or flocculent secretion, in which the female completely envelops herself at the period of parturition. Before the period of the formation of the ovisac, the females are decidedly active."

Three of our Australian species come into this group.

Pseudococcus casuarinæ, Maskell.

Trans. N. Zealand Institute, vol. xxv, p. 235, pl. xv, fig. 5. 1892.

Type specimens found at Myrniong, Victoria, on an undetermined species of *Casuarina*.

The adult female is enveloped in white cottony secretion forming a globular mass, sometimes irregular in form, and hardly a true ovisac.

The adult coccid yellowish brown, elliptical, slightly convex. Length, $\frac{1}{5}$ of an inch. Antennæ nine-jointed; the second longest; the others diminishing in length to the eighth; ninth as long as the sixth. Feet long, stout; digitules fine hairs. Anal tubercles very small. Anal ring with six hairs. Epidermis covered with circular spinnerets and fine short hairs; on the margin of each segment on either side a group of orifices and conical spines.

398. *Phenacoccus casuarinæ*. Cat. Coccidæ, p. 90.

Pseudococcus nivalis, Maskell.

Trans. N. Zealand Institute, vol. xxv, p. 234, pl. xvi, figs. 1–4. 1892.
Phenacoccus nivalis, De Charm, *Pro. Soc. Amicale Scientique*, p 42, pl. iii, figs. 3–3a. 1899.
Phenacoccus nivalis, Cockerell, *Check List Coccidæ*, p. 325. 1896.
„ „ Cockerell, *The Entomologist*, vol. xxxiii, p. 86. 1900.

This species was sent to Maskell, from either Brisbane or Sydney (the exact locality is doubtful) upon an undetermined species of acacia.

The adult female is covered with white cottony secretion above, but also produces a lighter cottony ovisac, often prolonged behind the insect. Adult female yellowish brown, form elliptical, slightly convex. About $\frac{1}{12}$ of an inch in length. The insect secretes a quantity of white cottony matter

covering the dorsal surface, together with a more felted mass, covering the ovisac, which is like that of *Pulvinaria*. Antennæ composed of nine joints; the first short, second longest, succeeding ones smaller, with the terminal one as long as the fourth; the fourth to sixth slender. Feet long, slender, tarsi with fine hairs; no digitules on the claw. Anal tubercles very small; anal ring with six hairs. Epidermis with groups of conical spines; circular spinnerets on either side, and scattered over the dorsal surface of the abdominal segments.

According to Cockerell, the species described from Mauritius by M. d'Emmerer de Charmoy on *Solanum* under the name of *Phenococcus nivalis*, is a distinct species and not this coccid.

410. *Phenacoccus nivalis*. Cat. Coccidæ, p. 92.

Pseudococcus stolatus, n.sp. (Fig. 72).

This species is not uncommon on the small branchlets of the scrub tree known as the dogwood (*Myoporum deserti*), thickly coating the bark with their oval white sacs. I have it from Cobar, Dubbo, Condobolin, and Bourke districts, New South Wales. This species was determined by Mr. E. E. Green.

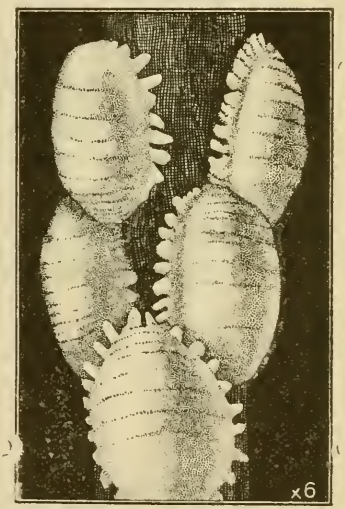

Fig. 72.—*Pseudococcus stolatus*, n.sp.

Adult female enclosed in an oval sac of light biscuit-brown colour, felted, distinctly ribbed with transverse lines as if marking the segmental divisions of the coccid beneath; often covered with white mealy secretion and the margins fringed with short fingers of white woolly filaments, with a circular anal aperture.

In the small immature females the whole surface is clothed with tufts of white filaments, and they look like some of the mealy bugs of the genus *Icerya*.

Adult female elongate, elliptical, pale yellowish brown. Length, $\frac{1}{8}$ of an inch; antennæ long, composed of nine joints; first short broad, second cylindrical, third slightly longer, fourth to seventh about equal length, eighth longer; ninth slightly longer than the eighth, rounded at tip with scattered hairs. Feet long slender, tarsus with hairs on either side, two short clubbed digitules. Anal ring with six hairs; anal tubercles small, inconspicuous: epidermis thickly covered with circular spinnerets, short rod-like processes, and short blunt spines, the latter forming groups on the edge of the abdominal segments.

Genus XXXIX. *Epicoccus*, Cockerell.

Ann. and Mag. Nat. History (ser. 7), vol. ix, p. 24. 1902.

This genus is defined by Cockerell as a *Dactylopid* with the anal ring without hairs; adult female with legs and antennæ; the latter well developed, cylindrical, six-jointed, the last joint long. It was created to contain a remarkable coccid that Maskell described under the name of *Coccus acaciæ*.

Epicoccus acaciæ, Maskell.

Coccus acaciæ, Trans. N. Zealand Institute, vol. xxix, p. 319, pl. xxi, fig. 4. 1897.
„ „ Fuller, *Trans. Ent. Soc., London*, p. 439. 1899.
Epicoccus acaciæ, Cockerell, *Ann. and Mag. Nat. History*, vol. ix, p. 24. 1902.

This curious coccid comes from near Perth, Western Australia, upon an undetermined small thorny acacia.

Adult female dark red, with yellowish tints, semi-globular, segmented and wrinkled. Diameter, about $\frac{1}{12}$ of an inch.

Antennæ composed of six joints, sixth longest, the third large, the rest of the segments short and of about equal length. The feet long, tibia slightly longer than the tarsus; all the digitules fine hairs. The anal tubercles very small. Anogenital ring small, simple, without hairs; margin without spines or hairs; the epidermis showing very few circular spinnerets.

Maskell described this species from dead specimens. Fuller in his description of the live coccids describes them as most brilliantly coloured.

388. *Epicoccus acaciæ*. Cat. Coccidæ, p. 89.

Genus XL. *Lachnodius*, Maskell.

Trans. N. Zealand Institute, vol. xxviii, p. 400. 1896.

The members of this genus are peculiar to Australia, and are found upon *Eucalyptus* and *Acacia*.

Maskell defines the genus as follows:—"Female insect active or stationary; naked or covered with cottony, mealy or waxy secretion. Body segmented. Antennæ of seven or eight joints, of which the last is not longer than the others; mentum monomerous; anal tubercles small or obsolete. Anogenital ring with more than eight hairs.

"Male insects normal of *Dactylopinæ*.

"The seven-jointed antennæ would not in itself be a distinctive character, but the shortness of the last joint, the monomerous mentum, and the hairs of the anal ring are quite sufficient."

Lachnodius eucalypti, Maskell.

Dactylopius eucalypti, *Trans. N. Zealand Institute*, vol. xxiv, p. 35, pl. vii, figs. 9–13. 1891; vol. xxv, p. 233, 1892; vol. xxvii, p. 65, 1894.
Lachnodius eucalypti, Mask, figs. 9–13, 1891; vol. xxviii, p. 400, 1896.

Type specimens collected by Crawford upon the bark of *Eucalyptus amygdalina*, South Australia, upon the leaves of *E. robusta*, Botany, and at Wallsend, New South Wales, on the foliage of *E. siderophloia*.

The female attaches herself to the upper surface of the leaf, causing a circular depression in the centre of a reddish blotch in the tissue of the leaf. The coccid fits into this pit, the dorsal surface raised a little above the rim, showing transverse markings covered with fine dull white cottony secretion.

Adult female, circular, flattened on the dorsal surface, convex beneath in the pit; at first lightly covered with grey mealy secretion, thickest on the margin; later on producing more white, longer filaments. Diameter, $\frac{1}{10}$ of an inch. Dull red, antennæ seven-jointed, the third longest, the seventh hardly longer than the sixth. Legs with rather short tarsus, only one-third the length of the tibia. Digitules fine long hairs. Anal tubercles very small. Anal ring with a number of fine hairs. Epidermis with many small spinnerets, and a number of long spiny hairs on the cephalic portion.

The males enclosed in sacs of loose white cotton; sometimes these tests are scattered among the females, at other times clustered together by themselves on the foliage.

434. *Lachnodius eucalypti*. Cat. Coccidæ, p. 95.

Lachnodius hirtus, Maskell.

Trans. N. Zealand Institute, vol. xxviii, p. 402, pl. xxii, figs. 1–9. 1896.

The specimens were collected on the foliage of a wattle (*Acacia*, sp.) at Thornleigh, New South Wales.

The adult female dark purple, covered with fine short white filaments over the fine hairs clothing the dorsal surface; general form subglobular. Diameter, from $\frac{1}{5}$ to $\frac{1}{4}$ of an inch. Antennæ with seven joints; the third longest; all the joints with a few hairs on the sides. Legs stout and long; the tibia three times the length of the tarsus with several long spines; tarsus short and thick with two slender spines; claw short; no digitules on tarsus or claw. Anal ring with about twenty hairs. Abdomen truncate at tip with no anal tubercles, but two of the dorsal hairs project beyond the margin.

"The excessive pubescence and the strongly spined and spurred tibiæ will distinguish this species."

435. *Lachnodius hirtus*. Cat. Coccidæ, p. 96.

Lachnodius lectularius, Maskell.

Trans. N. Zealand Institute, vol. xxviii, p. 40, pl. xxi, figs. 12–19. 1896.

The type specimens were collected on the twigs of young gums (*Eucalyptus rostrata*) growing at Mooroopna, Goulburn River, Victoria. These coccids formed depressions in the tissue of the twigs. Specimens collected at National Park and other localities near Sydney, New South Wales, attack the tips of the young shoots of *Eucalyptus corymbosa*, forming an irregular mass pointed at the tip, with the sides folding together, forming a box-like gall open along the dorsal surface.

The adult female is dark to reddish brown, convex and segmented; about $\frac{1}{5}$ of an inch in length. Antennæ composed of seven joints, the third longest, each with a few hairs. Legs stout, thickened tibia twice as long as the tarsus, with spiny hairs on each joint. Digitules fine hairs. Anal ring large, with from twenty to twenty-four hairs. The margin of the body with closely set, long, strong spines, each springing from a ringed tubular base. The epidermis covered with fine hairs; at the extremities masses of stronger spiny hairs, and on the abdominal segments a great many circular orifices.

436. *Lachnodius lectularius*. Cat. Coccidæ, p. 96.

Genus XLI. *Ripersia*, Signoret.

Ann. Soc. Entom. de France, vol. v, p. 335. 1875.
Newstead, *Mon. British Coccidæ*, vol. ii, p. 182. 1902.

The adult females resembling those of the allied genus *Dactylopius*. The antennæ vary from five to seven joints; anal lobes very variable, legs present. They live underground upon roots and are often found in ants' nests, but the ants may often be attracted to, and make their nests around, them. They are like most subterranean coccids, usually more or less coated with a mealy secretion, and have short anal appendages.

There are thirty-six species described from all parts of the world, but nearly two-thirds of them are peculiar to North America. Two are found in New Zealand and one in Australia.

Ripersia leptospermi, Maskell.

Trans. Royal Society, S. Australia, p. 106, pl. xiv, fig. 5. 1888.
Trans. N. Zealand Institute, vol. xxv, p. 235. 1892.
Newstead, *Ent. Monthly. Mag.*, vol. xxviii, p. 147. 1892.

This species was collected near Adelaide, South Australia, by Mr. Crawford upon an undetermined species of *Leptospermum*. This is a small species, the adult female measuring $\frac{1}{30}$ of an inch, and with the surrounding cotton $\frac{1}{8}$ of an inch in length. It is dark purple, covered with white meal, and surrounded with curling white filaments of cotton. The coccid is flattish, sub-circular, carinated on the back, but the segmentation not very distinct; the legs long, slender; anal tubercle inconspicuous, with short setæ.

573. *Ripersia leptospermi*. Cat. Coccidæ, p. 118.

Genus XLII. *Antonina*, Signoret.

Ann. Soc. Entom. de France, vol. v, p. 24. 1875.
Newstead, *Mon. British Coccidæ*, vol. ii, p. 207. 1902.
Laboulbenia, *Lichtenstein*, Mittheil, *Schw. Ent. Ges.*, vol. v, p. 229. 1878.

The members of this genus are subterranean in their habits, attaching themselves to the roots of grasses, sedges, and bamboo. A small group containing eight described species from Europe, America, Japan, New Zealand, and Australia. The type was described by Signoret from France on the roots of a grass. Newstead defines the genus as follows :—"Adult female without legs; anal lobes rudimentary; antennæ atrophied, or rudimentary; anal orifice with six hairs. Ovisac felted, or solid and wax-like. Larva with the anal lobes well developed; antennæ composed of six joints, and the anal orifice with six hairs."

Antonina australis, Green (Fig. 73).

Proc. Linn Soc. New South Wales, vol. xxix, p. 463, pl. xvi. 1904.
Froggatt, *Agric. Gazette New South Wales*, vol. xv, p. 407, pl. i, figs. 1–3. 1904.

This is the well-known "nut-grass coccid" discovered on the roots of nut-grass (*Cyperus rotundus*) in the Singleton district, New South Wales. It was claimed at one time that it was a useful coccid of economic importance as it only attacked the nodes of the nut-grass, which is a serious pest in fields and gardens. In some areas where the ground is not ploughed or disturbed, it does to some extent check the growth of the nut-grass, but only to a slight extent and chiefly in dry seasons.

The adult female is almost globular, fitting into a cavity in the soil attached to the root, covered with white floury secretion. General colour dull purple; smooth, shining, and easily removed from the cavity and felted secretion. Length, from 2 to 3½ mm. Antennæ minute consisting of two irregular joints; legs wanting. The whole surface of the body covered with circular spinnerets with some small hairs.

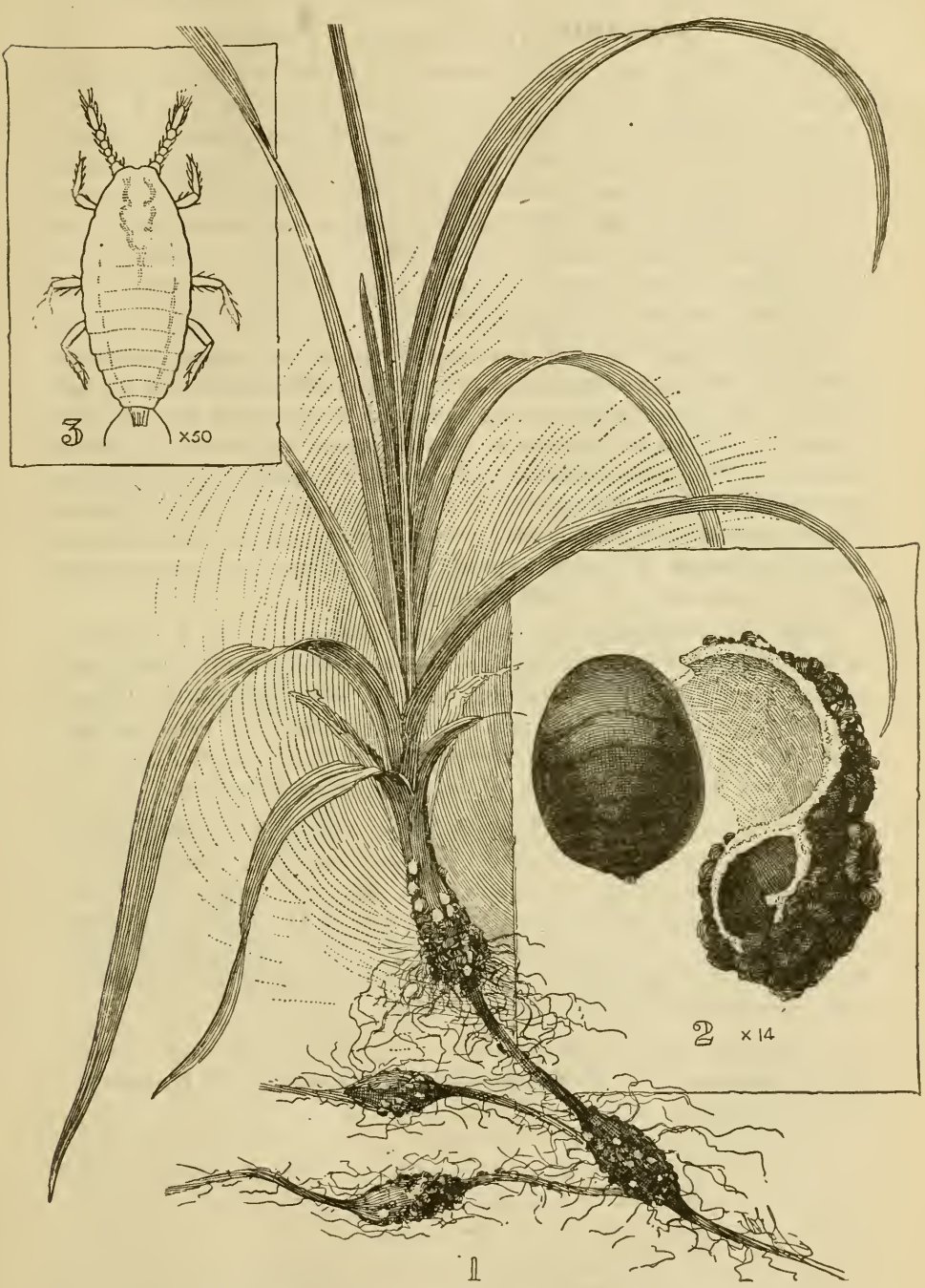

Fig. 73.—The Nut Grass Coccid. (*Antonina australis.*)

1.—A specimen of Nut Grass showing the coccid on the roots 2.—A mature female coccid sac.
3.—The larval coccid.

SUB-FAMILY IV.—*Brachyscelinæ*, Froggatt.

This division of the Coccidæ contains the typical gall-making coccids, within which galls the males and females develop with the growth of the aborted woody tissue. In most cases the male and female galls are distinct structures, but in a few the males and females are found within the same gall. The active, flattened, oval larvæ attach themselves to the bark of the branch or twig, or to the surface of the leaf, and through the irritation set up the woody tissue swells up round them until they are perfectly enclosed in a box-like gall. There is usually an apical orifice at the anal extremity, but this opening may be on the upper or under side of the leaf.

The adult female is top-shaped, irregularly rounded, or elongate, sometimes attached to the inner surface of the gall, in others fitting closely into the gall chamber, but perfectly free and not attached to the woody tissue by the rostrum. The legs and antennæ are usually more or less aborted, sometimes wanting. While the members of the genus *Apiomorpha* only infest the stems and foliage of *Eucalyptus*, others are more general in their habits. The integument is often stout and leathery, clothed with fine hairs and rows of short spines on the apical segments of the abdomen, the anal segment produced into a pair, or a single chitinous tail.

These gall coccids were first noticed and described in the *Transactions of the Entomological Society of New South Wales* in 1862, by Mr. H. L. Schrader, but nothing more was done until 1892, when the writer published his "Notes on the Family *Brachyscelidæ*, with some account of their Parasites, and descriptions of new species" in the *Proceedings of the Linnean Society of New South Wales*, which was followed by four other papers in the series.

In the following year, Mr. I. G. O. Tepper published "Descriptions of South Australian Brachyscelid Galls" (*Transactions of the Royal Society of South Australia*, 1893). In dealing with Australian galls, Mr. E. H. Rübsaamen figured and described other species in the *Berliner Entomolog Zeitschrift*, 1894. In the *Agricultural Gazette of New South Wales*, 1896, Mr. C. Fuller described some species, and added to the list in the *Transactions of the Entomological Society of London*, 1899.

The following genera of this sub-family are found in Australia:—Genus XLIII, *Apiomorpha*, XLIV *Opisthoscelis*, XLV *Ascelis*, XLVI *Cystococcus*, XLVII *Frenchia*.

Genus XLIII. *Apiomorpha*, Rübsaamen.

Bertliner Entomolog Zeitschrift, Bd. xxxix, p. 204. 1894.
Brachyscelis, Schrader, *Trans. Ent. Soc. N.S.W.*, pp. 1–6. 1862.
,, Froggatt, *Proc. Linn. Soc. N.S.W.*, pp. 354–356. 1892.

The male and female coccids form distinct galls on the stems, twigs, or foliage of different species of gum trees (*Eucalyptus*). Male galls are more or less tubular, from which the males can emerge. Female galls form box-like structures containing an oval cell with a small opening at the apex; female coccid not attached to the gall, quite free within the gall, with the tip of the abdomen pointing upward to the apical orifice. Adult female turbinate or pear-shaped; epidermis smooth but wrinkled, clothed with fine hairs; short blunt spines along the hind margin of the segments on the dorsal surface of the abdominal segments. Mouth, legs, and antennæ present but aborted; the anal segment furnished with a pair of hard thickened chitinous tails (anal appendages). There is no distinct anal ring, but a depression at the base of the tails in which is situated the anal opening. In all stages of their development they are more or less covered with a floury secretion. The male coccid is a delicate two-winged creature, with long, slender antennæ and long legs; abdomen slender, with a long white filament, twice the length of the whole insect, on each side of the tip of the abdomen. The larvæ are flattened, oval creatures with the margin encircled with a fringe of cilia; well-developed legs and antennæ. They are born inside the parent gall and emerge through the apical orifice.

In some species the galls vary, or specimens become aborted through the presence of inquilines, and this has led to some describers forming new species from an examination of the galls alone. The structure of the galls is very variable, but the specific characters of the adult females are very constant, and they can easily be determined.

The specific name *Brachyscelis citricola*, used by Schrader on page 3 in the paper quoted, is only a name and no species was described under it, so it is not placed in the list of species. Where Rübsaamen, Tepper, and others have named variable species from the galls alone, I have not treated them as sub-species because, while the galls may be aborted into different shapes, in a large series one can always get the typical form; the anal appendages and spines upon the dorsal surface of the thoracic and abdominal segments of the adult female coccid are constant. The specific name *Ellipsoidalis*, Tepper, is only a name without any description.

Apiomorpha attenuata, Froggatt (Fig. 74).

Brachyscelis attenuata, Proc. Linn. Soc. N.S.W., p. 375, pl. 8, figs. 5–7. 1898.

This unique species was described from a spray of flower buds of an undetermined species of eucalyptus received from South Australia, the exact locality being unknown.

Fig. 74.—*Apiomorpha attenuata*, Froggatt.

Female gall spindle-shaped, slender at base, truncate at apex, springing from the flower bud on twig. Length, $1\frac{1}{2}$ inches; greatest girth, $\frac{1}{6}$ of an inch. Apical orifice circular, wall of chamber thin, chamber very long.

Adult female dull yellow, apex of fifth and sixth segments and anal appendages black, cephalic and thoracic segments oval, abdominal segments slender, tapering to the anal appendages, which are broad at the base, widely opening out in the centre, the cylindrical tails turned outward with a small spine on the inner margin near the tips; dorsal surface, abdominal segments constricted, third to sixth transversely barred with fine spines and fine hairs. Length, $\frac{1}{2}$ inch.

Male galls with the female galls, slender, cylindrical; apex bell-shaped, $\frac{1}{4}$ inch in length.

118. *Apiomorpha attenuata*. Cat. Coccidæ, p. 40.

Apiomorpha bäuerleni, Froggatt Fig. 75).

Brachyscelis bäuerleni, *Proc. Linn. Soc. N.S.W.*, p. 369, pl. vii, fig. 4. 1892.
Apiomorpha bäuerleni, Rübsaamen, *Berl. Ent. Zeit.*, Bd. xxxix, p. 200, p. xi, fig. 2. 1894.

Specimens were collected upon an undetermined species of *Eucalyptus* at Ballina, New South Wales.

Female galls firmly attached at the base in clusters of two or three, to the branches; broadly rounded, outer surface lightly ribbed, depressed on the summit; the walls consisting of a double shell, the outer thick and soft, inner one hard and thin, with often a slight cavity on either side of the rounded small apical orifice. Height, $\frac{3}{4}$ inch, width slightly over $\frac{1}{2}$ inch. Chamber broad, rounded, conical at apex.

Adult female broadly turbinate, much wrinkled, short, abdominal segments coming to a point, fringed with fine hairs and a row of short spines; anal appendages black, short, thickened at the base, close together at base, slightly opened at tip. Length slightly over $\frac{1}{2}$ an inch, and $\frac{1}{3}$ of an inch across the centre of thorax.

Male gall unknown.

119. *Apiomorpha bäuerleni*. Cat. Coccidæ, p. 40.

Fig. 75.—*Apiomorpha bäuerleni*, Froggatt. (Female.)

Apiomorpha conica, Froggatt (Figs. 76 and 77).

Brachyscelis conica, *Proc. Linn. Soc. N.S.W.*, p. 365, pl. vi, fig. 3. 1892.
Apiomorpha conica, Rübsaamen, *Berl. Ent. Zeit.*, Bd. xxxix, pls. xi and xiv, p. 209. 1894.
„ *similis*, Rübsaamen, *Berl. Ent. Zeit.*, Bd. xxxix, p. 210, pls. xi and xiv. 1894.
Brachyscelis regularis, Tepper, *Trans. Roy. Soc. S.A.*, p. 273, pl. iii, fig. 3. 1893.
„ *subconica*, Tepper, *Trans. Roy. Soc. S.A.*, p. 274, pl. iv, fig. 1. 1893.

This species has a wide range; it is common on the foliage of *Eucalyptus viminalis* in New South Wales, and has been collected in Victoria on *E.*

Fig. 76.—Variations in *Apiomorpha conica*, Froggatt.
1. Large form, female gall. 2. Aborted form on flower-buds. 3. Aborted form on twigs.
4. Young female galls. 5. Young female galls, broader form. 6. Female galls, adult specimens.
7. Male galls on leaf.

gunnii at Hamilton, *E. regnans* at Croydon and Mooroobunk (C. French, junior), and in South Australia on several undetermined species of eucalypts.

The female galls spring from a rounded base, singly or in clusters, on the branchlets, and are oval, rounded, tapering to a truncate annulated tip with the small circular apical orifice situated in a circular depression. The young female galls are often elongate and cylindrical, with the tip truncated and the apical orifice closed with a button-like cap that drops off as the gall matures and swells out. These elongate, slender galls, if found without the adult female galls, would never be considered as immature forms of this variable species. Length up to $1\frac{1}{4}$ inches, but variable in form and size.

Adult female broadly turbinate; cephalic and thoracic segments not much wrinkled; abdominal segments lightly clothed with fine hairs on the sides, a few scattered spines on the first, and a regular band of spines on the following ones; anal appendages short and blunt, deflexed outward at the tips. Length, $\frac{3}{4}$ of an inch; breadth, $\frac{1}{3}$ of an inch.

Male galls tubular, slender, bell-shaped at the apex, springing out from the small branchlets, but sometimes on the leaves. Under $\frac{1}{2}$ an inch in length, and about $\frac{1}{12}$ of an inch in diameter.

123. *Apiomorpha conica*. Cat. Coccidæ, p. 40.

Fig. 77.—*Apiomorpha conica*, Froggatt.

Apiomorpha cucurbita, Fuller.

Trans. Ent. Soc. London, p. 446, pl. xv, fig. 13. 1899.

This coccid comes from Kimberley, North-west Australia, where it was collected upon *Eucalyptus uncinata*. I have never seen this species. The author says that when fresh the female galls are striped with white and green, resembling a small gourd.

Female galls smooth, hanging down, ellipsoidal, constricted at the base, the apex truncated, slightly dilated, with the apical orifice sunk at the summit in a slight depression. Length, 1¼ inches; greatest diameter 0·9 inch. Adult female not described. Fuller says that at first he considered it a variety of Tepper's *Apiomorpha regularis*.

124. *Apiomorpha cucurbita*. Cat. Coccidæ, p. 41.

Apiomorpha dipsaciformis, Froggatt.

Brachyscelis dipsaciformis, Proc. Linn. Soc. N.S.W., p. 202, pl. xix, fig. 1. 1895.

The unique type specimen was sent on the twigs of a slender-leaved Eucalypt from Queensland by the Government Botanist to Mr. Tepper, of the Adelaide Museum, with no exact locality stated.

Female galls sometimes solitary, but in others clustered in groups of two or three, springing from a flattened button-like excrescence on the twig; dark, reddish-brown, oval, ½ an inch in height and about ⅓ of an inch in diameter. The whole surface to the rounded apical orifice covered with spiny bracts, turning downward like a small teasle.

Adult coccid pale yellow, broad, turbinate, clothed with fine hairs, thickest on the sides and forming a brush at the anal extremity. Legs short, with small claws; abdominal segments with a band of long slender spines and long hairs; anal appendages black, short, stout, cylindrical, divided in the centre and opening out at the tips, which are slightly pointed.

125. *Apiomorpha dipsaciformis*. Cat. Coccidæ, p. 41.

Apiomorpha duplex, Schrader.

Brachyscelis duplex, Trans. Ent. Soc. N.S.W., vol. i, p. 2, 1862, pl. ii, figs. A, h, l, o, s.
,, ,, *Verh. z. b. Ges. Wien*, p. 160. 1863.
,, ,, Signoret, *Ann. Soc. Ent., Francc*, vol. vi, p. 596. 1876.
,, ,, Froggatt, *Proc. Linn. Soc. N.S.W.*, p. 358. 1892.
,, ,, ,, *Natural Science*, vol. v, p. 111. 1894.
,, ,, ,, *Agric. Gazette N.S.W.*, vol. ix, p. 490. 1898.

This remarkable gall springs directly out of the side of the branchlet of several species of eucalypts, and is not uncommon in the Sydney district and northward to Newcastle and in the Blue Mountains of New South Wales.

Female gall sessile, four-sided, swelling out into a green four-sided elongated ridged mass, variable in size but averaging 1½ inches in diameter and 2½ inches in length from the base to the apical orifice, which forms a narrow slit between the two flattened curled leaf-like horns, often 7 or 8 inches in length, that are produced on either side of the solid basal gall.

Adult female golden yellow, thickly enveloped in floury secretion and clothed with fine hairs. Somewhat flattened on the vertical surface, with rows of spines on the dorsal surface of the abdominal segments, together with tufts of long white hairs. Anal appendages long, slender, pointed, with three long hairs at the extremities pointing outward. Length of coccid, 1 inch; width at centre of thorax, ½ inch.

Male galls short, four-sided, opening out at the tips, springing from the leaves or on the horns of the female gall. Length, $\frac{1}{4}$ inch.

126. *Apiomorpha duplex.* Cat. Coccidæ, p. 41.

Apiomorpha excupula, Fuller (Fig. 78).

Brachyscelis excupula, Agric. Gazette N.S.W., vol. vii, p. 217, pl. iii, figs. 4–7. 1896.

This species was first recorded from Port Stephens, New South Wales, on an undetermined species of eucalypt. I have had several fine series from the Tweed River, New South Wales.

This species was described and figured from the galls alone. Fuller gave no description of the coccid. I have retained his suggested name. Female galls often in masses on the branchlets of the gum-tree, the basal portion not unlike the cup of an acorn, from which springs out the egg-shaped gall, the whole surface of which is covered with flattened slender tapering bracts forming a regular ring round the apical orifice, which is small and circular. Height of gall, about 1 inch; width about $\frac{1}{2}$ inch.

Fig. 78.—*Apiomorpha excupula*, Fuller.

Adult female yellow, very broadly turbinate, with the tip of the abdomen coming to a fine point; thickly clothed with fine long yellow hairs on the sides of the lower abdominal segments, and forming a brush extending beyond the anal appendages. Antennæ very well defined, four-jointed; legs short and stout; the last thoracic and the first three abdominal segments with a few scattered reddish spines; fourth and fifth with longer scattered spines forming tufts on the outer margins; sixth small, with a large bunch of long spines and hairs on either side. Anal appendages bright reddish-brown, finely rugose, broad at the base, fitting into the centre of the last abdominal segment, with a central depressed line at the base, above which is a central saddle-shaped plate, then a narrow slit, then the tails come together and at the extremity open out at a V-shaped angle, blunt and rounded at the tips, arcuate on the outer margins. Length of coccid, slightly over $\frac{1}{2}$ inch.

Male gall slender, slightly roughened tubes with no distinct expansion at the apex, but may be immature. Springing from the side of the basal cup of the gall. About $\frac{1}{4}$ inch in length.

129. *Apiomorpha excupula.* Cat. Coccidæ, p. 41.

Apiomorpha fletcheri, Fuller (Figs. 79 and 80).

Brachyscelis fletcheri, *Agric. Gazette N.S.W.*, p. 215, pl. iv. 1896.
„ „ Froggatt, *Agric. Gazette N.S.W.*, vol. ix, p. 494. 1898.

This species has a wide range. The types were collected in an undetermined eucalypt near Richmond, New South Wales. I have found it at Wagga and at other localities on the red-gum (*Eucalyptus rostrata*), and at Hay, New South Wales, upon a box-gum (*E. bicolor*). Fuller records it from Swan River, Western Australia, on another gum-tree, and French from Dandenong Range, Victoria, on *E. regnans*.

The females infest the branches, which swell out into aborted masses of tissue forming galls of all shapes and sizes, several inches in length, and broad in proportion. In these irregular woody masses the true coccid galls are embedded, usually hidden under the surface of the bark, but when the rough, dead, surface bark is pulled off, the apical tip of the upper half of the

Fig. 79.—*Apiomorpha fletcheri*, Fuller.
(Female.)

gall may be seen level with the surface or slightly projecting. The apical half of the gall, though it appears to be first formed of the bark, as the galls mature becomes a distinct funnel-shaped or conical cap, hard and solid with a very small circular opening fitting close against the upper rim of the lower half of the gall, which is a smooth white circular convex pit in the solid wood, in which the coccid rests, the tails reaching into the cap. Diameter of pit above, $\frac{1}{4}$ inch; depth of pit, $\frac{1}{3}$ inch; the cap portion of gall, $\frac{1}{3}$ inch. There are often three or four of the coccid gall pits in each woody mass, and the trees are often covered all over the branches with these woody excrescences.

Adult female coccid dull yellow, with the apical abdominal segments and legs reddish-brown; the anal appendages black. Length, $\frac{1}{2}$ inch. General form elongate, turbinate, constricted at the apex of the thoracic segment, tapering to the tip. Antennæ and legs well defined. Dorsal surface covered with fine scattered spiny hairs, very lightly upon the thoracic portion, but

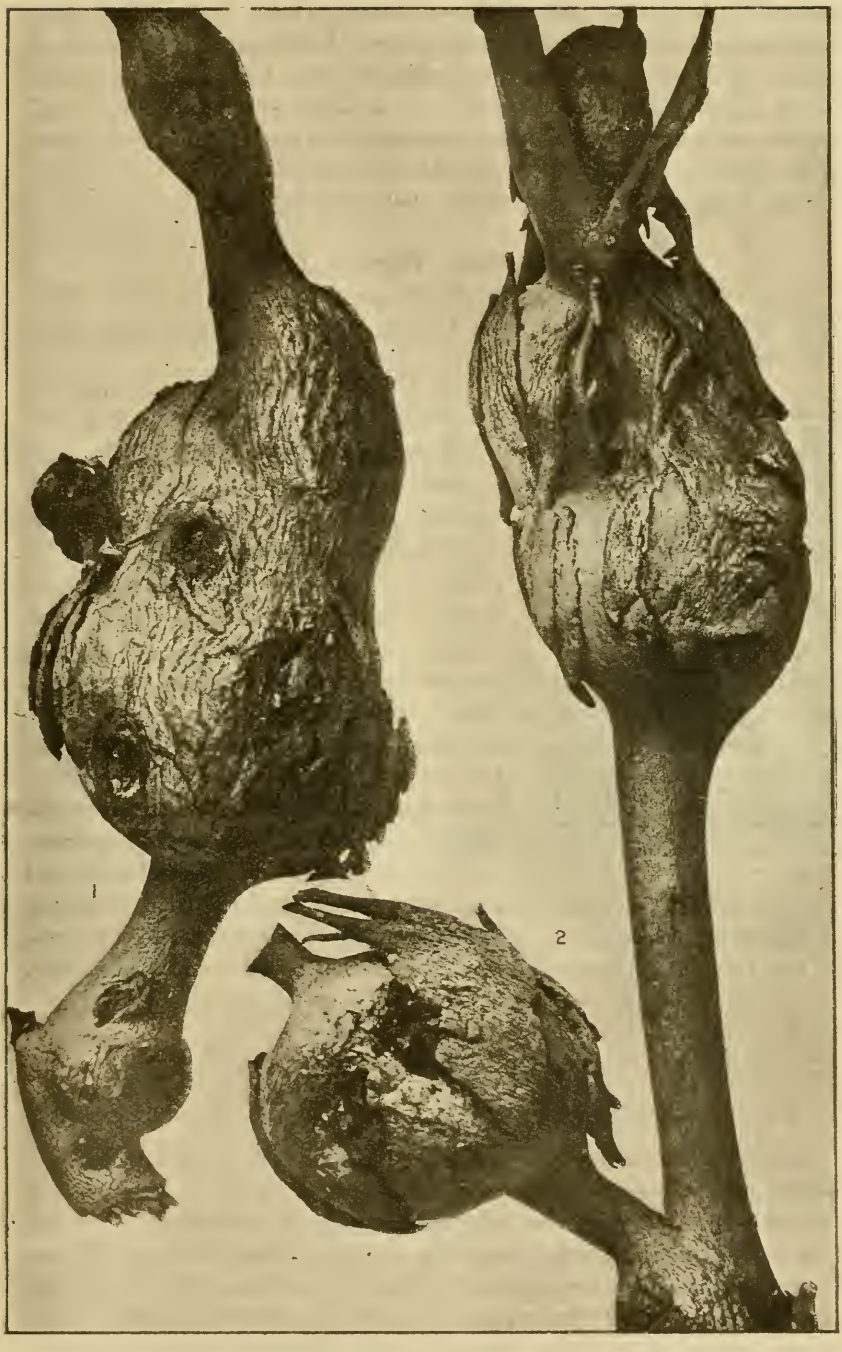

Fig. 80.—*Apiomorpha fletcheri*, Fuller.

thickly fringing the lower edges of the abdominal segment, smaller ones scattered all over the surface. Though having a stout base, all these seem to terminate in hairs and are not true spines. Anal appendages moderate in length, very rugose, with blunt spines along the sides, broad, the base opening out above, twisted and often turned over each other at the tips.

I have examined a large amount of material, and think this is a well-defined species distinct from *A. karschi*, to which it is allied.

131A. *Apiomorpha karschi fletcheri*. Cat. Coccidæ, p. 42.

Apiomorpha floralis, Froggatt Fig. 81.

Brachyscelis floralis, Proc. Linn. Soc. N.S.W., pl. viii, fig. 8, p. ix, figs. 9–10. 1898.

The type specimens came from Central Australia on an undetermined species of eucalypt.

Fig. 81.—*Apiomorphia floralis*, Froggatt.

Female gall springing from a cluster of flower buds and growing alone like *A. ovicola*, which they resemble in general form; others grow from the side of the branchlets. Broadly rounded at the base, oval, tapering to the apex, cone-shaped and truncated, but thickened on the edge, forming a rim round the small circular apical orifice, which is in a slight depression. Height, 1¼ inches; diameter, ¾ inch. Adult coccid pale yellow, broadly turbinate, abdominal segments tapering, segmental divisions distinct; dorsal surface covered with fine short reddish spines, forming a broad parallel band from the cephalic segment to the anal appendages, scattered on the abdominal segments, fringed on the sides with fine hairs, and the spines thickest on the edge of the two last segments; anal appendages short, stout, close together, forming a blunt tip, with two short spines on either side. On the ventral surface a prominent but aborted mouth forming a raised tubercle. Legs large, stout; claws black. Length of coccid, 1 inch.

129. *Apiomorpha floralis*. Cat. Coccidæ, p. 41.

Apiomorpha frenchi, n.sp. (Fig. 90—4, 5, 6).

This fine species was collected by Mr. C. French, junior, at Werribee River, Victoria, upon a red-gum (*Eucalyptus rostrata*).

Female galls sessile, growing out from the twigs in rows, slightly rounded at the base, cylindrical, sharply cut off at the apex, which is convex with the circular apical orifice in the centre. When immature, green and slightly roughened, but later on as they reach maturity the outer surface turns brown and dry, peeling off in flakes. Height, ½ inch; diameter, slightly over ⅓ inch.

Adult female yellow, with the anal appendages black tipped with reddish brown. Broadly turbinate, anal abdominal segments slender. Dorsal surface clothed with fine hairs on the cephalic and thoracic area; those upon the latter more spiny; the first four abdominal segments clothed with spiny hairs, the following three reddish brown, with a transverse band of dark reddish-brown spines and interspersed hairs fringing the sides. Anal appendages black, rugose and broad at the base, opening out into a broad cleft about half-way down, and the tails produced into fine points, bearing scattered stout spines and long hairs.

Apiomorpha globosa, n.sp.

The female galls formed on the branchlets of the red-gum (*Eucalyptus rostrata*), on the river banks near Hay, New South Wales.

A squat, broadly oval gall, springing from a button-like base on the side of the twigs; sides rounded to the slightly flattened apex; surface much cracked and roughened, with a small circular apical orifice. Height, slightly over ½ inch, and as broad across. Large numbers of these galls are aborted into irregular round masses of woody tissue, due to the action of hymenopterous parasites in the gall and wood tissue.

Adult female coccid dull yellow ; anal appendages black or reddish brown. Length, slightly under ½ inch. General form turbinate, the cephalic portion broadly rounded, abdominal segments tapering. Dorsal surface clothed with fine scattered hairs, with a few fine spines lightly scattered over the thoracic segments, but forming regular transverse bands of large reddish spines down the centre of the abdominal segments, interspersed with spiny hairs. Anal appendages red to black, short, broad at base, with the tips coming to a point, a slight narrow cleft between them, then in contact and then again turning outward at the extreme tips; the outer margins fringed with short angular spines, the last ones so close to the tips that they look as if cleft; the surface finely granulated. Legs short, but broad; claws small.

Apiomorpha helmsii, Fuller (Fig. 82).

Journal West Australian Bureau of Agriculture, vol. iv, p. 1346. 1897.
Trans. Ent. Soc. London, p. 447, pl. xv, fig. 12. 1899.

Found upon the branchlets of an undetermined species of eucalypt near Perth, Western Australia.

Female galls clustered in twos and threes along the side of the twig; sessile, narrow at the base, swelling out and rounded on the sides, with from five to seven distinct ribs, coming round to a truncate tip, from the centre of which springs out a little cone, at the tip of which is the small anal orifice. The ridged sides of this gall give it a very striking appearance. Height, up to 1 inch; diameter in centre, ½ inch.

Adult female coccid orange yellow; anal segments reddish brown; turbinate, with the abdominal segments tapering to the extremity. Dorsal surface with the whole of the epidermis covered with short reddish thorn-shaped spines, thickest in the centre, producing a dorsal stripe, forming apical fringes of longer spines on the abdominal segments. Fuller says, "Epidermis with many small multiocular pores, and clothed with numerous short hairs." Anal appendages slender, rugose, tapering, opening out at the apex, with a short blunt spine on the outer margin near the tip. Antennæ and legs aborted.

Fig. 82.—*Apiomorpha helmsii*, Fuller.

Male galls tinted with yellow, produced upon the leaves, short cylindrical tubes; ribbed on the sides, dilated at the apex. Height, $\frac{1}{10}$ inch.

Fuller does not give any measurements of the adult female.

130. *Apiomorpha helmsii.* Cat. Coccidæ, p. 42.

Apiomorpha hilli, n.sp. (Figs. 83 and 84).

This remarkable species is found in the neighbourhood of Darwin, North Australia, in all stages of growth in July, upon the branchlets of the "woolly-butt" (*Eucalyptus miniata*).

Female galls broadly oval, the apex truncate, with the outer margin forming a rampart round a circular pit, $\frac{1}{3}$ inch in depth, where there is a flattened reddish floor, in the centre of which is the small circular apical orifice. In the earlier stages of the gall's growth the apex of the gall runs up into

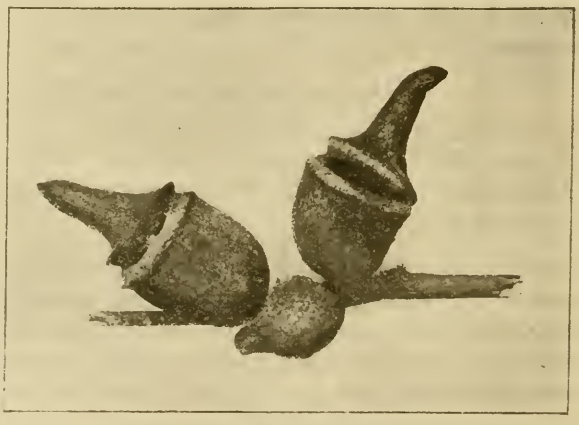

Fig. 83.—*Apiomorpha hilli*, Froggatt.

a blunt point, but as it matures the upper portion cracks across and drops off, or remains attached on one side of the gall proper, exposing the cavity below the fracture. Length, up to 3 inches with the apical section intact; diameter of gall, 1 inch. The adult galls, when the apical section falls off, are wonderfully like the seed capsules or fruits of this eucalypt.

Adult female coccid dull yellow, with legs, antennæ, and apical segments ferruginous, anal appendages black or dark reddish-brown. General form broadly rounded, with the tip of the abdomen coming to a blunt point. Length, slightly over ½ inch; diameter, just under ½ inch at the broadest part. Dorsal surface somewhat truncate on the cephalic portion, flattened on the thorax, showing three deep sutures; abdominal segments small, sutures convex, the first two fringed with long spiny reddish hairs and a few spines; the following four segments densely fringed with similar hairs and slender spines, the latter in the living specimen almost hidden by the hairs. Anal appendages very short, rounded, tapering to the apex, where they open out. The whole surrounded with tufts of reddish hairs extending beyond the tips of the anal segments. Ventral surface deeply corrugated; the first three abdominal segments smooth, fourth and fifth fringed with spiny hairs, fifth impressed in the centre, showing a rugose area between it and the thick fringe of hairs surrounding the base of the anal segment.

The first specimens of this handsome gall were received from Mr. Banks, of the U.S. Science Bureau at Manila, Philippines, who had received them from a visitor who had been stopping at Port Darwin. When Mr. Hill wrote to me from Darwin, I sent him a description of this coccid, which he soon found and forwarded to me.

Mr. Hill informs me that when freshly collected, the upper cavity of the gall is often filled with a globule of honey-dew.

Apiomorpha karschi, Rübsaamen.

Berl. Ent. Zeit., Bd. xxxix, p. 211.

This species was described from a specimen in the Berlin Museum, probably from Southern Queensland, on an undetermined species of eucalypt. It comes close to *Apiomorpha fletcheri*, Fuller. The gall is similar, imbedded in an irregular mass of woody tissue, apparently, from the figure given, on a smooth-stemmed gum-tree. The author's description of the gall formation agrees with that of *A. fletcheri*, but the differences in the spines and anal appendages, if constant, should give it specific rank.

Rübsaamen says: "Thorax globular, larger than the abdomen, which narrows to the tip; anal segments covered with thickened integument. It is much less hairy than other species; legs well developed, and all the feet have claws. The proboscis appears to consist of several articulations, with two stout bristles. The anal segment very slender; anal appendages moderately thin and pointed, furnished on the outer edge with several pointed tubercules."

131. *Apiomorpha karschi*. Cat. Coccidæ, p. 42.

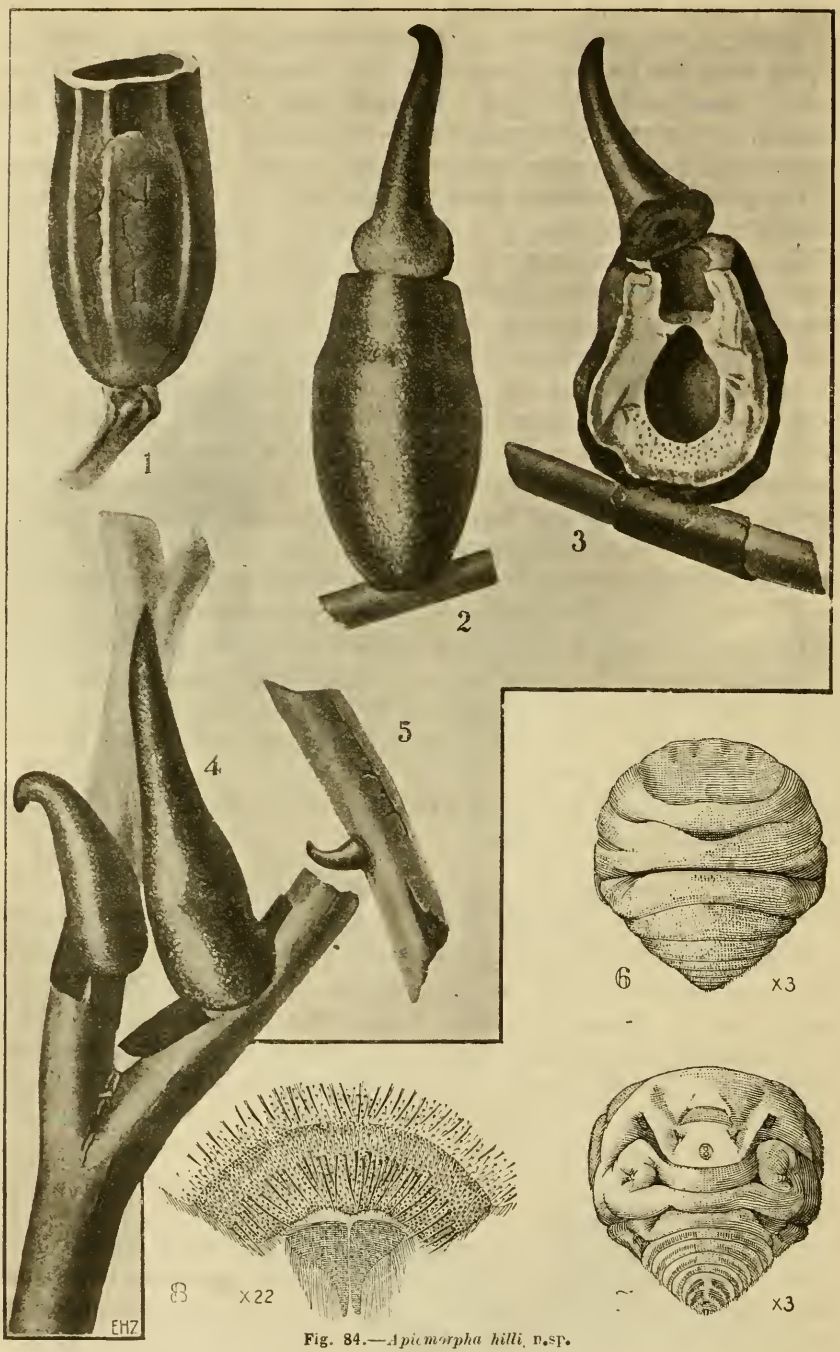

Fig. 84.—*Apicomorpha hilli*, n.sp.

EXPLANATION.

1. Seed Capsule of *Eucalyptus miniata*, showing likeness to gall.
2. Female gall, with terminal portion cracking off from the basal portion.
3. Female gall, with terminal portion cracking off from the basal portion (cross section).
4. Immature female galls.
5. First stage of female gall.
6. Dorsal view of female coccid.
7. Ventral view of female coccid.
8. Anal segments and anal appendages of female coccid (much enlarged).

Apiomorpha maliformis, Fuller (Fig. 85).

Journal West Australian Bureau of Agriculture, vol. iv, p. 1346. 1897.
Trans. Ent. Soc. London, p. 446, pl. xv, fig. 14. 1897.

These galls, according to Fuller, are usually, though not always, found growing upon the flower-buds of *Eucalyptus patens*, a common gum about Swan River, Western Australia. I have a fine series of specimens from Dr. Cleland from the same locality on the same species of gum-tree, but most of them are on the branchlets.

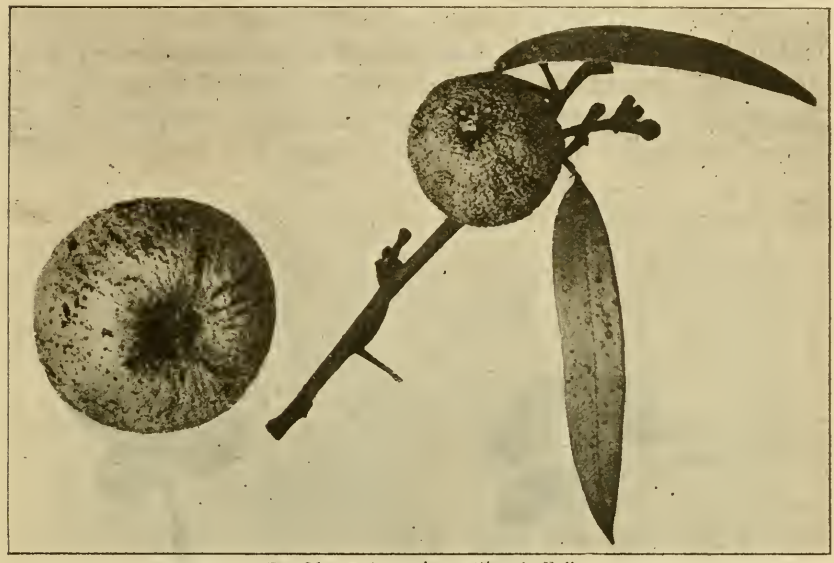

Fig 85.—*Apiomorpha maliformis*, Fuller.
Female.

Adult female gall subspherical, variable in size and form, sessile, greyish brown, broadly rounded to the summit, where it is depressed, with the small circular anal orifice in the centre of the depression. Average height, 1 inch; diameter at summit, $1\frac{1}{4}$ inches. Walls of gall thick, composed of fleshy tissue, with the elongate oval gall chamber in the centre enclosed in a hard shell.

Adult female coccid pear-shaped, yellow, with the anal segment reddish brown and chitinous. Dorsal surface clothed with spiny hairs scattered on the abdominal and thoracic segments, longer and thicker on the abdominal; the first three abdominal segments with transverse bands of stout, reddish spines; the following four segments fringed along the hind margin with stouter spines. Anal appendages close at base, with distinct division to the tips, where they are deflected outward; short, broad at base, tapering and rugose to the tips, which are swollen with a stout tubular spine near the extremity, clothed with fine hairs. Anal ring defined. Legs large, thickened, claws short.

132. *Apiomorpha maliformis*. Cat. Coccidæ, p. 42.

Apiomorpha minor, Froggatt (Figs. 86 and 87).

Brachyscelis minor, *Proc. Linn. Soc. N.S.W.*, vol. vii., p. 363, pl. v., fig. 1. 1892.
,, ,, *Agric. Gazette N.S.W.*, vol. ix, p. 491. 1898.

The type specimens were collected on *Eucalyptus hæmastoma*, at Wollongong, New South Wales. I have also had them from other localities in New South Wales, and from Mr. C. French, junior, Warrandyte, Victoria, on *E. polyanthema*.

Female coccid gall small, oval, broadest at the base, attached directly to the twig, often in clusters of four or five; contracted on the sides to the truncate apex; the small circular apical orifice placed in the centre of a slight depression. Height slightly over $\frac{1}{2}$ inch, diameter at widest girth $\frac{1}{3}$ inch.

Fig. 86.—*Apiomorpha minor*, Froggatt.

Fig. 87.—*Apiomorpha minor*, var., Froggatt.

Adult coccid dull yellow, broadly turbinate; dorsal surface clothed with fine hairs, thickest on the abdominal segments, together with small spines along the hind margins; anal appendages small, short, close together to tips, where they open out. Ventral surface clothed with fine hairs, legs slender, abdominal segments very regular, tapering to the tip. Length under $\frac{1}{2}$ inch.

Male galls of the usual tubular form, with the apex expanded; dull red, thickly massed together on the leaves. Height, $\frac{1}{4}$ inch.

133. *Apiomorpha minor*. Cat. Coccidæ, p. 42.

Apiomorpha munita, Schrader. (Figs. 88, 89, and 90).

Brachyscelis munita, *Trans. Ent. Soc. N.S.W.*, vol. i, p. 6, pl. ii. 1862.
" " *Verh. Z. B. Ges. Wien*, p. 160. 1863.
" " Signoret, *Ann. Soc. Ent., France*, vol. vi, p. 597. 1876.
" " Froggatt, *Proc. Linn. Soc. N.S.W.*, vol. vii (2nd series), p. 359. 1892.
" " Tepper, *Trans. Royal Soc. S. Australia*, p. 273, pl. iii. fig. 1. 1893.
" *tricornis*, Froggatt, *Proc. Linn. Soc. N.S.W.*, vol. vii (2nd series), p. 361. 1892.
Apiomorpha cornifex, Rübsaamen, *Berl. Ent. Zeit.*, Bd. xxxix, p. 205. 1894.

This is one of the commonest and most variable species of the genus. I believe that all the galls with the four-sided angular formation, with horns springing from each angle, belong to this species. Found over the greater part of New South Wales; at Botany, upon *Eucalyptus robusta*; in Victoria by C. French, junior; Mallee Scrub, South Australia, Tepper; Perth, Western Australia, Fuller.

Fig. 88.—*Apiomorpha munita*. Schrader.
(Female.)

Female galls very variable; sessile, base rounded, forming four angles to the apex, from each of which springs out a slender curled horn; in others a more flattened, leaf-like appendage on each angle; between the four horns the central area flattened with the small apical orifice in the centre. Sometimes these galls stand out by themselves upon the twigs perfectly formed, but very often they are aborted, matted together, and mixed up with the male galls. Average height 1 inch, with the projecting horns from 2 to 4 inches in length.

Male galls small irregular tubes, forming irregular masses matting the twigs together, and often springing from the horns of the female galls; in some cases forming a regular mass of pale pink tubes, like coral.

Fig. 89.

Apiomorpha munita, Schrader.

Mass of male gall tubes; each of these tubes contains a tiny winged male coccid. These masses are sometimes called "vegetable coral."

Adult female yellow, legs and anal appendages dark brown, broadly turbinate; the constriction between the thoracic and abdominal regions very slight, tapering to the apex. Dorsal surface clotted with long yellow spiny hairs, very much scattered above the abdominal segments; upon the latter these hairs appear to spring from well-defined tubercles, and are thickest upon the fourth, fifth, sixth, and anal segments. Anal appendages broad at the base, short, roughened on the outer margins, and divided by a slight suture. Length, $\frac{3}{4}$ inch.

134. *Apiomorpha munita*. Cat. Coccidæ, p. 42.

Apiomorpha ovicola, Schrader.

Brachyscelis ovicola, *Trans. Ent. Soc. N.S.W.*, vol. i, p. 5, pl. ii, figs. 3 a, e, f. 1862.
,, ,, *Verh. Z. B. Ges. Wien*, p. 160. 1863.
,, ,, Signoret, *Ann. Soc. Ent., France*, vol. vi, p. 596. 1876.
,, ,, Froggatt, *Proc. Linn. Soc. N.S.W.*, vol. vii, p. 367. 1892.
,, *glabra*, Tepper, *Trans. Royal Soc. S. Australia*, p. 278, pl. iii, fig. 4. 1893.
,, *ovicoloides*, Tepper, *Trans. Royal Soc. S. Australia*, p. 277, pl. iii, figs. 2 a, f. 1893.

This gall is usually found singly upon the large white gums, such as *Eucalyptus hæmastoma* and *E. rostrata*, but when upon young trees gregarious, with the male galls (typical tubular, bell-mouthed forms) upon the leaves and the females upon the twigs. Widely distributed over New South Wales; also reported on *Eucalyptus melliodora*, Stawell; *E. incrassata*, Mallee, Victoria; and *E. gracilis*, South Australia.

Female galls green, smooth, oval, attached at base to the twigs, apical orifice small, circular at the extremity, not depressed. Variable in size, and many aborted by insect attacks. Height, $1\frac{1}{4}$ inches; diameter, $\frac{3}{4}$ inch.

Male galls thickly scattered over the leaves with a reddish-brown tint, tubular, often curved, expanded at extremities. Height, $\frac{1}{4}$ inch.

Adult female pale yellow, apical segments and anal appendages ferruginous; turbinate, broadly rounded to the first abdominal segment, then tapering to a point. Dorsal surface lightly clothed with fine hairs, with a very distinctive dorsal stripe of short, reddish, thorn-like tubercles, from the cephalic portion to the abdominal segment, where they cover the whole surface. Anal appendages long, slender, in contact, covered with rounded tubercles bearing spiny hairs; the sides fringed with short spines. Ventral surface much corrugated, cephalic portion prominent; legs and antennæ well defined.

135. *Apiomorpha ovicola*. Cat. Coccidæ, p. 43.

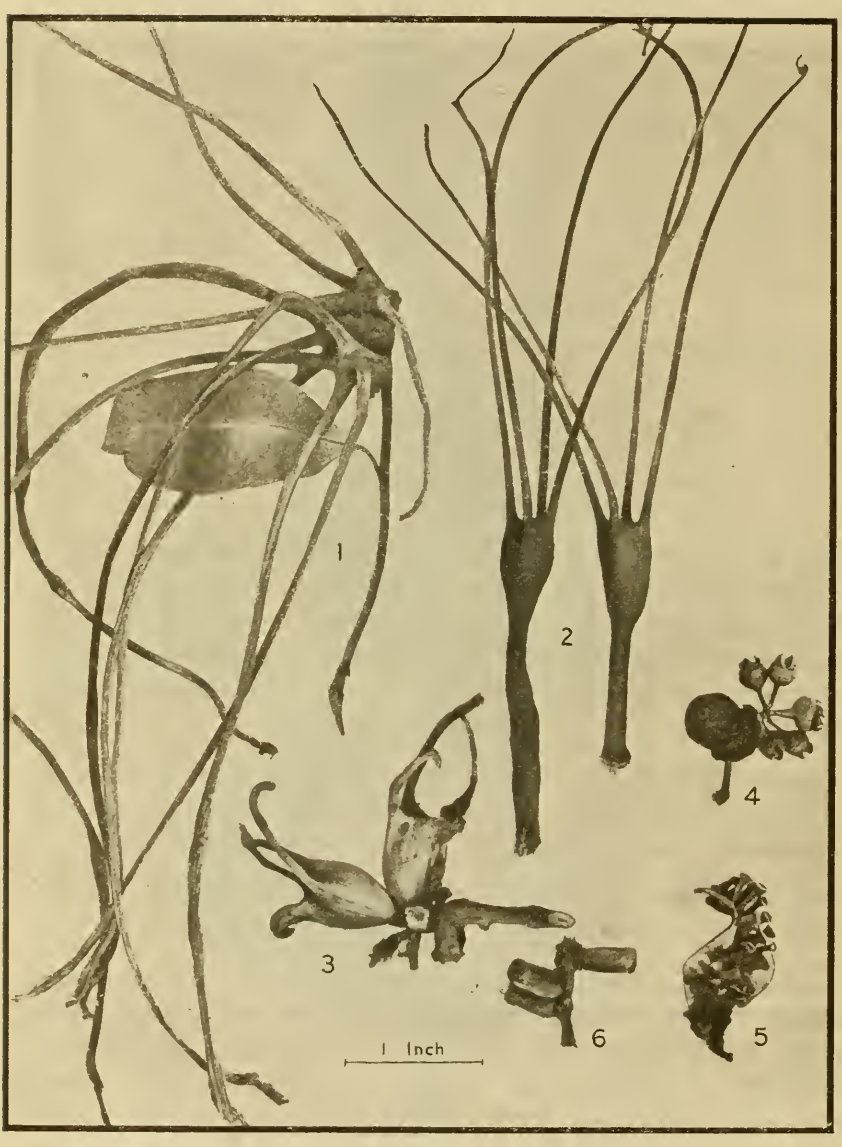

Fig. 90.

Apiomorpha munita, Schrader.

1 Adult form of female gall. 2. Straight-horned form of adult female.
3. Short broad form of adult female.

Apiomorpha frenchi, n.sp.

4. Adult galls. 5. Male galls on leaf. 6. Immature female galls.

Apiomorpha pedunculata, Fuller (Fig. 91).

Brachyscelis pedunculata, *Agric. Gazette N.S.W.*, vol. vii, p. 212, pl. i, figs. 1–5. 1896.
Brachyscelis pedunculata, Froggatt, *Agric. Gazette N.S.W.*, vol. iii, p. 494. 1892.
Brachyscelis pedunculata, Froggatt, *Natural Science*, vol. v, p. 111. 1894.

This handsome, stalked gall is found singly or in groups of three or four upon the branchlets of *Eucalyptus viminalis* in the coastal districts near Sydney, New South Wales, and on an undetermined species of eucalyptus near Melbourne, Victoria (C. French, junior).

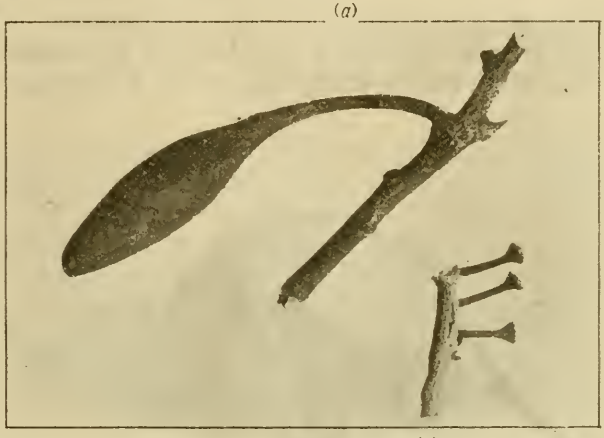

Fig. 91.—*Apiomorpha pedunculata*, Fuller.
(*a*) Female. (*b*) Male.

Female galls, with the basal portion consisting of a slender, cylindrical stalk, often longer than the elongate oval apical gall containing the coccid; the oval gall truncate at the tip, with the apical orifice in the centre. Length of gall up to 3 inches, the stalk being about the same length as the apical portion. Diameter, $\frac{1}{3}$ inch in the centre.

Male galls of the typical tubular form, very slender, with the apex very much dilated, springing from the leaf or the surface of the twigs beside the female galls. Length, $\frac{1}{4}$ inch.

Adult female dull yellow, apical segments dark brown; general form elongate, oval; cephalic and thoracic segments rounded; the last thoracic and abdominal segments long and tapering. Dorsal surface clothed with scattered spiny hairs, with a broad dorsal stripe from the base to the apex formed of fine reddish, thorn-like spines, spreading out into a transverse band on the third and fourth abdominal segments, with a fringe of longer spines on the following segments. Anal appendages cylindrical, tapering, and separated at the extremities; clothed with long hairs. Ventral surface much corrugated, legs and antennæ well defined; the hind pair of legs large, projecting on the sides. Length, $\frac{3}{4}$ inch.

137. *Apiomorpha pedunculata*. Cat. Coccidæ, p. 43.

Apiomorpha pharetrata, Schrader (Fig. 92).

Brachyscelis pharetrata, Trans. Ent. Soc. N.S.W., vol. i, p. 4, pl. i, figs. o, s, pl. ii, fig. 39. 1862.
,, ,, *Verh. Z. B. Ges. Wien*, pl. iii, fig. 2. 1863.
,, ,, Signoret, *Ann. Soc. Ent., France*, vol. vi, p. 595. 1876.
,, ,, Froggatt, *Proc. Linn. Soc. N.S.W.*, p. 370. 1892.
,, ,, ,, *Natural Science*, vol. v, p. 111. 1894.
,, ,, ,, *Agric. Gazette N.S.W.*, vol. ix, p. 491. 1898.

This species has a wide range over the coastal districts of New South Wales upon *Eucalyptus sieberiana, E. corymbosa*, and *E. capitellata*. From the Alps, Victoria, Mr. C. French, junior, sent it upon *E. pauciflora*.

Fig. 92.—*Apiomorpha pharetrata*, Schrader.

Female galls generally spring from the stalk or midrib of the leaf, several often clustered together twisting up the infested leaf. General form oval, tapering at both extremities; surface roughened, apex with a rounded, button-like tip, surrounding the circular apical orifice. Height, up to ½ inch. Cockscomb-like growth or envelope of reddish tinted tissue, springing out from the under side of the erect female gall, irregularly rounded on the outer surface, and up to ¾ inch in length and the same in diameter. The inner surface is deeply convex and finely perforated with circular pits containing the male larvæ, several hundred in number.

Adult female yellow, turbinate, abdominal segment small and tapering; dorsal surface clothed with fine hairs fringing the abdominal segments; slight transverse bands of short reddish spines on the first three, with closer bands on the following abdominal segments. Anal appendages black, stout at the base, slender and divided at the apex, with the tips turning in towards each other. Length, ⅓ inch.

138. *Apiomorpha pharetrata*. Cat. Coccidæ, p. 43.

Apiomorpha pileata, Schrader (Fig. 93).

Brachyscelis pileata, *Trans. Ent. Soc. N.S.W.*, p. 3, pl. i, fig. 1. 1862.
,, ,, *Verh. Z. B. Ges. Wien*, p. 190. 1863.
,, ,, Signoret, *Ann. Soc. Ent., France*, vol. vi, p. 593. 1876.
,, ,, Froggatt, *Proc. Linn. Soc. N.S.W.*, p. 363, 1892; and p. 10, 1908.
,, ,, ,, *Natural Science*, vol. v, p. 112. 1894.
,, ,, ,, *Agric. Gazette N.S.W.*, vol. ix, p. 491. 1898.

This species is common in the neighbourhood of Sydney on the smaller bushes of *Eucalyptus sieberiana* and other species; also collected in Dandenong Ranges, Victoria, by C. French, junior, upon *E. amygdalina*.

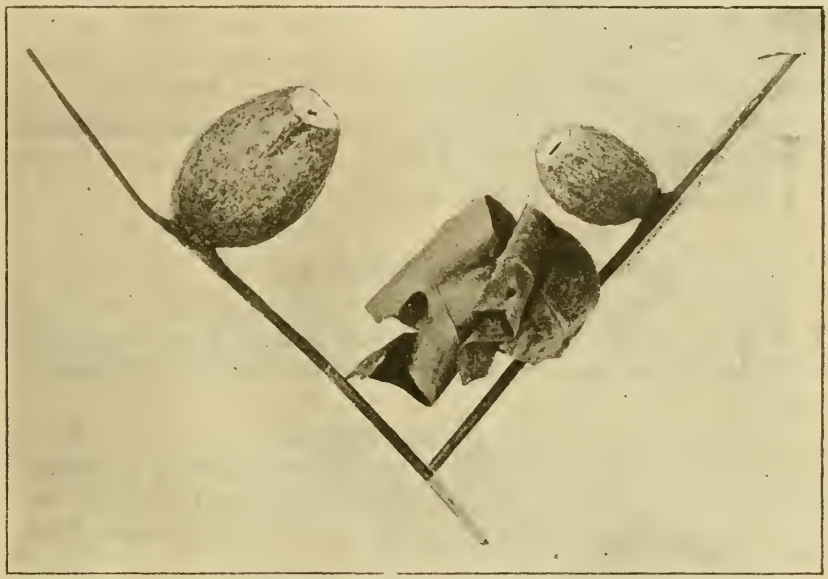

Fig. 93.—*Apiomorpha pileata*, Schrader.

There are two very well-defined forms of female galls, but there are no specific differences in the enclosed adult female coccid.

In the first form, the female galls are slender, turned down, springing from the branchlets; rounded at the base, oval; rather uniform in diameter to the rounded apex, which is truncate at the apex with the two sides forming a double lip, the apical orifice in the form of a narrow slit between them. In the immature forms, while growing, there is a pointed, fleshy cap covering the apex, but as the galls mature they become long-tailed processes, dry up and fall away from the top of the gall, exposing the apical slit and tip. Average length, 1 inch; diameter, about $\frac{1}{2}$ inch.

Second form broad, oval, more erect upon the twigs. These are much more rounded, fleshy galls, with a slightly roughened surface, often darker in colour. The apical portion contracted and rounded, with the cleft on the summit; the apical orifice forms a slit at the bottom of the depression.

Adult female pale yellow, broad to the base, flattened on the ventral surface, with the abdominal segments much broader than usual, rounded at the apex. Dorsal surface thickly clothed with fine white hairs, extending beyond the segmental divisions, and forming marginal tufts; a few scattered reddish spines on the last thoracic segment, and more scattered spines on the first two abdominal segments; third to sixth abdominal segments fringed across with larger, closer spines and bristles; at the base is a distinct anal ring. The anal appendages widely apart at the base, standing out like long spiral horns, roughened, with tubercles bearing fine hairs, turning outward at the tips, which are cleft and furnished with three long bristles. Length, $\frac{3}{4}$ inch, and much broader in proportion than the turbinate forms.

Male galls thickly scattered over the leaves; short, tubular, roughened, and expanded at the apex. Height, $\frac{1}{4}$ inch.

139. *Apiomorpha pileata*. Cat. Coccidæ, p. 44.

Apiomorpha rosæformis, Froggatt (Fig. 94).

Brachyscelis rosæformis, *Proc. Linn. Soc. N.S.W.*, p. 204, pl. xix, fig. 3. 1895.

This unique specimen came from Wingham, Manning River, New South Wales, where it was growing upon the leaf of an undetermined species of eucalypt.

Fig. 94.—*Apiomorpha rosæformis*, Froggatt. (Male and Female.)

Female gall very slender, cylindrical, slightly roughened on the surface, swelling out at the apex into an oval form twice the width of the base; the apex rounded, apical orifice small, circular. Height, $\frac{3}{4}$ inch; $\frac{1}{6}$ inch in diameter at the widest place.

Male gall envelope with a short stalk springing from the upper side of the female gall, formed of a wrinkled, irregular, slightly convex mass of bright red tissue, with the under surface very slightly convex, with over a thousand tubular pits containing the male larvæ. Width, $1\frac{1}{2}$ inches across and $\frac{1}{4}$ inch thick.

Female coccid yellow, turbinate; too much damaged by parasites to be described in detail.

141. *Apiomorpha rosæformis*. Cat. Coccidæ, p. 44.

Apiomorpha rugosa, Froggatt (Fig. 95).

Brachyscelis rugosa, *Proc. Linn. Soc. N.S.W.*, p. 369, pl. viii, fig. 5. 1892.
„ „ *Agric. Gazette N.S.W.*, vol. ix, p. 492. 1898.

Specimens collected at Allalong, near Maitland, New South Wales, on an undetermined species of eucalyptus.

Female galls sessile, springing from the branchlets; general form squat, hemispherical; outer surface rugose, irregularly ridged, forming a spongy sheath beneath, enclosing a thin hard shell forming a centre for the coccid chamber. Summit depressed; apical orifice small, circular. Height and diameter, $\frac{2}{3}$ inch.

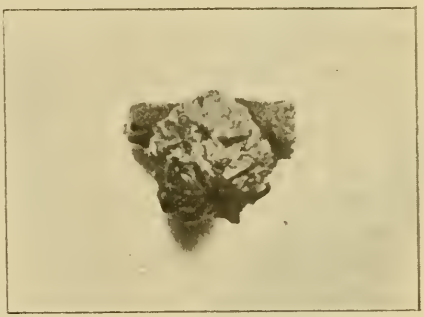

Fig. 95.—*Apiomorpha rugosa*, Froggatt. (Female).

Adult female dull yellow, broadly turbinate, head and thoracic segments much wrinkled on the ventral surface. Dorsal surface fringed with fine hairs produced into tufts at the apex; abdominal segments small, fringed with spiny hairs, and small spines. Anal appendages black in contact, roughened on the outer margins, blunt. Length, $\frac{1}{2}$ inch.

142. *Apiomorpha rugosa*. Cat. Coccidæ, p. 44.

Apiomorpha sessilis, Froggatt.

Brachyscelis sessilis, *Proc. Linn. Soc. N.S.W.*, p. 203, pl. xix, fig. 2. 1895.
„ „ *Agric. Gazette N.S.W.*, vol. ix, p. 491. 1898.

These galls were obtained near Newcastle, New South Wales, on an undetermined species of eucalyptus.

Female galls growing directly out of the branchlets, the base buried in the tissue, which forms an oval swelling surrounding them. Galls cylindrical to the apex, which is truncate, with a small cone in the centre surrounding the small circular apical orifice. Height of gall above the basal swelling, $\frac{1}{3}$ inch.

Adult female dull yellow, clothed with fine hairs, broadly turbinate. Dorsal surface covered with scattered tubercles, which form transverse rows of short dark spines on the abdominal segments, thickest upon the anal ones. Anal appendages very short, broad at the base, in contact to near the extremities where they open out. Ventral surface very much wrinkled, antennæ and legs very small, basal joints of hind legs almost globular. Length, $\frac{1}{3}$ inch.

143. *Apiomorpha sessilis*. Cat. Coccidæ, p. 44.

Apiomorpha sloanei, Froggatt (Fig. 96,—1 and 2).

Brachyscelis sloanei, Proc. Linn. Soc. N.S.W., p. 373, pl. viii, figs. 1–4. 1898.

Type specimens collected in the Wagga District, New South Wales, upon the foliage and branchlets of an undetermined species of eucalyptus.

Adult female gall long, slender, but very irregular in form, somewhat like a swollen thickened short gall of *A. pedunculata*; sometimes the basal portion is smallest, cylindrical and swelling out into an elongate oval in the apical half, with the apical orifice situated on a little nipple at the extremity. At other times the gall is of a uniform thickness from the base at the twig, to the extreme tip. Length, variable up to $2\frac{1}{2}$ inches; diameter in the widest part up to $\frac{1}{2}$ inch.

Adult female coccid about 1 inch in length, slender, rounded at the head, and tapering to the anal appendages. Dorsal surface flattened on cephalic area, marked with a ring of shallow depressions round the edge; thoracic segments corrugated on apical margin; first five abdominal segments cylindrical, the fifth fringed with fine spines, sixth and seventh longer and fringed with fine spines, eighth longer than the rest of the abdominal segments combined, lightly covered with fine spines. Anal appendages black, close together at the base, opening out at tips.

144. *Apiomorpha sloanei*. Cat. Coccidæ, p. 45.

Apiomorpha strombylosa, Tepper (Fig. 96,—3 and 4, and Fig. 97).

Brachyscelis strombylosa, Trans. Royal Soc. South Australia, vol. xvii, p. 277, pl. iv, fig. 3. 1893.

,, *crispa*, Fuller, *Agric. Gazette N.S.W.*, vol. vii, p. 213, pl. ii, figs. 1–5. 1896.

,, *strombylosa*, Froggatt, *Agric. Gazette N.S.W.*, vol. ix, p. 492. 1898.

,, ,, Fuller, *Trans. Ent. Soc. London*, p. 445. 1899.

A common gall on the large-leaved ironbark (*Eucalyptus siderophloia*) in the neighbourhood of Sydney, New South Wales; on *E. incrassata*, South Australia, Tepper; on *E. polyanthema*, C. French, junior; on *Eucalyptus*, sp., Western Australia, Fuller.

Female galls varying from dark red to almost black, with the surface corrugated and resembling a broad rounded she-oak (*Casuarina*) seed cone. Spherical, rounded to the summit, which is flattened, with the small circular apical orifice situated on a cone-shaped nipple in the centre. Often single upon the branchlets, but sometimes in clusters of half a dozen. Height, 1 inch; diameter, $\frac{3}{4}$ inch.

Male galls very numerous, often covering all the surface of the adjacent foliage; very slender, cylindrical, slightly dilated at the apex, reddish brown. Length, to $\frac{1}{4}$ inch.

Adult female broadly turbinate, the thoracic and abdominal segments fitting close to each other, terminating in an angular point. General colour bright yellow, anal segments reddish brown, anal appendages reddish brown

Fig. 96

1. *Apiomorpha sloanei*, Froggatt (abnormal form).
2. Same (normal form).
3. *Apiomorpha strombylosa*, Tepper (male galls).
4. Same (female gall).

to black. Dorsal surface clothed with fine spines and hairs, very few upon the cephalic portion, more numerous and longer on the thorax, and upon the abdominal segments forming transverse bands of stouter spines, with clear pores on the chitinous lower margins. Anal appendages very rugose, rounded at the base, with a distinct median opening between them, the

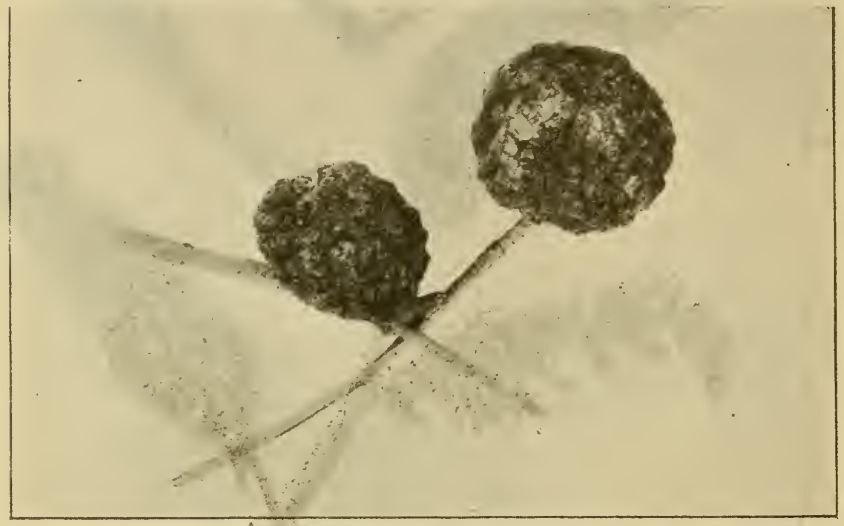

Fig. 97.—*Apiomorpha strombylosa*, Tepper.

blunt tips opening out, clothed with spiny hairs. Ventral surface wrinkled, with the antennæ and legs well developed; hind legs very broad at the base. Length, about ½ inch.

Tepper only described the female gall of this species, but it was prior to Fuller's detailed life history of this fine coccid, so that Tepper's name stands.

145. *Apiomorpha strombylosa.* Cat. Coccidæ, p. 45.

Apiomorpha thorntoni, Froggatt (Fig. 98).

Brachyscelis thorntoni, Proc. Linn. Soc. N.S.W., p. 371, vol. vii, pl. vi, fig. 6. 1892.
,, *nux*, Fuller, *Agric. Gazette N.S.W.*, vol. vii, p. 214, pl. iii, figs. 1–3. 1896.
,, *thorntoni*, Froggatt, *Agric. Gazette N.S.W.*, vol. ix, p. 495. 1898.

This species is found upon the foliage of *Eucalyptus piperita*, Newcastle, New South Wales, and has a wide range along the coast. Fuller's specimens came from Bungendore, New South Wales; also found on *E. amygdalina*, Dandenong, Victoria, by C. French, junior.

Adult female galls springing out from the midrib of the leaves, oval, coming to a slightly truncate apex; the outer surface of the gall ribbed, anal aperture small, circular. Height, ⅔ inch.

Male galls brown to dull red, enclosed in a rugose irregular sheath, often turned downwards, and attached to the upper side of the female gall, usually with the two sides coming towards each other, enclosing large numbers of male gall tubes.

Adult female pale yellow, cylindrical, slightly turbinate, rounded on the apex; thoracic segments much wrinkled; abdominal segments small, coming to a sharp tip. Dorsal surface with a few scattered hairs on the thoracic segments, thicker on the abdominal; first abdominal segment without spines, second and third with a few scattered spines along the centre, fourth, fifth, and sixth with a fringe of spines along the hind margins, in the last longer and stouter. Anal appendages long, slender, separated at the base, then closed together until near the tips, where they are deflexed and truncate. Length, $\frac{1}{3}$ inch.

Fig. 98.—*Apiomorpha thorntoni*, Froggatt. (Male and Female.)

This is another species in which the cockscomb-shaped mass of male galls is attached to the oval female galls, as in *A. pharetrata and A. rosæformis*. Fuller's species is identical with mine, both in gall, structure, and enclosed coccid.

146. *Apiomorpha thorntoni*. Cat. Coccidæ, p. 45.

Apiomorpha umbellata, Froggatt (Fig 99).

Brachyscelis umbellata, *Proc. Linn. Soc. N.S.W.*, vol. viii, p. 336, p. xvi, figs. 1–2. 1893.
,, ,, *Agric. Gazette N.S.W.*, vol. ix, p. 492. 1898.

This unique gall was described from a cluster of female galls on an undetermined species of eucalyptus from Cobar, New South Wales. They were so like the seed capsules of a gum-tree that they were sent to the Technological Museum under the impression that they were the seeds of a new species.

Fig 99.—*Apiomorpha umbellata*, Froggatt. (Female.)

Female galls green, slender, narrowest at the base, cylindrical, swelling out to the apex, which is truncate but roughened and warty; the apical orifice surrounded with a raised nipple. Length, 1 inch; diameter at base, $\frac{1}{5}$, and at apex, $\frac{1}{3}$ inch.

Adult female bright yellow, slender, rounded at apex, tapering to tip of abdomen. Dorsal surface depressed in the centre of cephalic

area, with a ring of dark spots, the whole clothed with fine hairs; those upon the thoracic segments more springy, with long white hairs on the outer margins; first two abdominal segments with a few scattered short reddish spines, the following segments thickly clothed with stouter spines. Anal appendages reddish brown, long, slender, roughened in contact to near the tips where they open out, covered with fine spines and long hairs.

148. *Apiomorpha umbellata.* Cat. Coccidæ, p. 45.

Apiomorpha urnalis, Tepper (Fig. 100).

Brachyscelis urnalis, Trans. Royal Soc. South Australia, vol. xvii, p. 274, pl. iv fig. 2. 1893.
„ „ Froggatt, *Proc. Linn. Soc. N.S.W.*, vol. xxiii, p. 371. 1898.
„ „ „ *Agric. Gazette N.S.W.*, vol. ix, p. 494, pl. fig, f. 1. 1898.
„ *Schraderi*, Fuller, *Agric. Gazette N.S.W.*, vol. vi, p. 214, pl. i, fig. 1. 1896.

This beautiful little gall has a wide range over New South Wales, and is sometimes found massed together in bunches, when many are often aborted and irregular in form; when scattered over the twigs they have the typical jug or urn shape. Found at Tamworth, Uralla, Goulburn, Wellington, and Hay, New South Wales; in the last-named case upon the box tree (*Eucalyptus bicolor*); in Victoria, at Werribee, upon *Eucalyptus leucoxylon* and *E. goniocalyx* by C. French, junior; and in South Australia, at Murray Bridge, on *Eucalyptus gracilis* and *E. uncinata* by Tepper.

Fig. 100.—*Apiomorpha urnalis*, Tepper.

Female galls attached at the rounded base to the twigs and branches, with the basal portion rounded, oval, about two-thirds of the height, then contracted into a narrow neck, but at the apex swelling out into a flat disc, roughened on the flattened summit with the apical orifice surrounded by a small nipple. Height, 1 inch.

Female coccid dull yellow, slender. Dorsal surface rather convex, clothed with scattered spiny hairs, the first four abdominal segments of uniform length; the apical ones fringed with stout spines. Anal appendages black, slender, in contact at the base, opening out at the tips, and with the anal segments fringed with fine hairs. Under-surface much wrinkled on the cephalic and thoracic segments, the latter bisected with an impressed line. Legs ferruginous, thickened, with large claws.

149. *Apiomorpha urnalis.* Cat. Coccidæ, p. 45.

Apiomorpha variabilis, Froggatt (Fig. 101).

Brachyscelis variabilis, *Proc. Linn. Soc. N.S.W.*, p. 364, pl. vii, fig. 2. 1892.
,, ,, *Natural Science*, vol. v, p. 12. 1894.
,, ,, *Proc. Linn. Soc. N.S.W.*, vol. xxiii, p. 374 (larva). 1898.
,, ,, *Agric. Gazette N.S.W.*, vol. ix, p. 493. 1898.

This large solid green gall is found singly, growing directly from the side of a stout branch or small twig upon *Eucalyptus piperita* in the vicinity of Sydney, but it ranges all over the coastal districts of New South Wales.

Female gall, consisting of a large oval, solid, woolly mass surmounted on the summit with a contracted softer mass of tissue, forming a dome over the gall proper. The apical orifice is in the summit of the hard woody gall,

Fig. 101.—*Apiomorpha variabilis*, Froggatt.
(Female.)

but there is a rugged opening at the apex of the dome between which and the apical orifice there is an irregular cavity. The gall often turns downward on the stem from which it is produced. Height, $2\frac{1}{2}$ inches; diameter, $1\frac{3}{4}$ inches. No male galls have ever been noticed.

Female coccid yellow, broadly turbinate. Dorsal surface of the cephalic region lightly clothed with fine hairs; the thoracic segments covered with long spiny hairs; the first abdominal segments thickly clothed with long spiny hairs interspersed with short scattered spines; the last five abdominal segments chitinous, with central bands of stout reddish spines, many circular orifices, and long spiny hairs. Anal appendages short, closed at base, tapering to a blunt tip, rugose, and covered with stout spiny hairs. Under-surface clothed with fine white hairs. Length, $\frac{2}{3}$ inch.

Genus XLIV. *Opisthoscelis*, Schrader.

Trans. Ent. Soc. N.S.W., vol. i, p. 10, 1862.
Rubsaamen, *Berliner Ent. Zeit.*, B. xxxix, p. 214, 1894.
Cockerell, *Canadian Entomologist*, vol. xxxi, p. 276, 1899.

This genus was very briefly defined by Schrader when he described his type *Opisthoscelis subrotunda*: "Genus *Opisthoscelis* where they have only two long posterior legs. The galls of *Opisthoscelis* are often found male and female under the same leaf. The female gall is in the shape of a pea, but somewhat larger; the male gall very small and conical."

Signoret simply copied his words, and added nothing to the definition of the genus. Rubsaamen gave a general account, but evidently had no fresh material. Cockerell simply says, in his "Tables for the determination of the genera of Coccidae": "Hind legs only present; these long."

The male and female coccids, like those of the genus *Apiomorpha*, both produce distinct galls differing in the sexes; most of these galls are conical, rounded, or spine shaped, and the opening may be on either the upper or the under side of the gall; the adult female, usually fitting close into the gall chamber, sometimes firmly attached to it. The antennæ and the first two pair of legs wanting or aborted; the hind pair very long, the tarsal portion produced into a long hair-like filament, longer than the tibiæ, and sometimes curved round over the back. The tip of the anal segment bearing a peg-like tail.

These gall-making coccids confine their attention to the foliage of the genus *Eucalyptus*, and like the members of the genus *Apiomorpha*, have not been recorded upon any other plants.

Opisthoscelis conica, Fuller (Fig. 102).

Journal W. Australian Bureau Agriculture, vol. iv, p. 1346, 1897.
Trans. Ent. Soc. London, p. 464, 1899, pl. xv, figs. 33, 34.

This species was described from specimens obtained upon the foliage of an undetermined species of Eucalyptus, at Midland Junction, West Australia.

Fig. 102.

Female gall formed in the tissue of the leaf, hemispherical on the under-surface of the leaf, cone-shaped on the upper side. Height, 0·3 to 0·4 of an inch.

Adult female light brown, covered with mealy secretion, convex, distinctly segmented; antennæ and first two pair of legs wanting; hind legs very long; epidermis clothed with many long fine-curved spines, thickest on cephalic region, and with tail forming a tuft at the apex. Length, 0·75 inch.

151. *Opisthoscelis conica*. Cat. Coccidæ, p. 46.

Opisthoscelis fibularis, Froggatt.

Pro. Linn. Soc. N.S.W., vol. xviii, p. 344, pl. xvi, figs. 17–21, 1893.
Agric. Gazette N.S.W., vol. ix, p. 498, 1898.

The male and female galls formed upon the upper surface of several undetermined species of Eucalypts, Bathurst, New South Wales; Bendigo, Victoria.

The female gall one-sixth of an inch in height, and about the same diameter at the base, which forms a circular ring; brown; produced into a tapering thorn, with the apex truncated and open, the orifice having a lip on either side. Male galls smaller, somewhat similar, forming a reddish wart on the under side of the leaf.

Adult female pale yellow; cephalic and thoracic segments rounded; abdominal ones tapering to tail; epidermis clothed with fine hairs; hind legs well developed.

152. *Opisthoscelis fibularis*. Cat. Coccidæ, p. 46.

Opisthoscelis maculata, Froggatt (Fig. 103).

Pro. Linn. Soc. N.S.W., vol. xviii, p. 345, pl. xvi, figs. 22–23, 1893.
Agric. Gazette N.S.W., vol. ix, p. 497, 1898.

The male and female galls produced upon the leaves of the Mallee gum (*Eucalyptus gracilis*), Bendigo, Victoria.

Fig. 103.—*Opisthoscelis maculata*, Froggatt.
♂ Galls.

The female gall one-fourth of an inch in height, pyriform; apex with a slit; the lips curving outward on the sides. The male galls are reddish brown, slender, tubular, slightly contracted at the serrate apex; about one-sixth of an inch in height, often covering the whole of the leaf.

Adult female attached along the ventral surface to the bottom of the cavity in the gall chamber; dorsal surface flattened, showing segmental divisions, with impressed spots on either side of the first four segments; anal one tapering into a tail clothed with scattered white hairs, hind legs very long; tarsi thread-like.

154. *Opisthoscelis maculata.* Cat. Coccidæ, p. 46.

Opisthoscelis mammularis, Froggatt (Fig. 104).

Pro. Linn. Soc. N.S.W., vol. viii, p. 344, pl. xvi, figs. 15–16, 1893.

Agric. Gazette, N.S.W., vol. ix, p. 497, 1898.

The male and female galls scattered over the foliage of an undetermined species of *Eucalyptus*, Bendigo, Victoria.

Female gall forming a somewhat wrinkled erect green excrescence on the upper surface of the leaf, broadest at the base, narrowed about two-thirds up, and swelling out and rounded on the summit. Height, one-fourth of an inch. Opening into a reddish brown wart on the under-surface of the leaf.

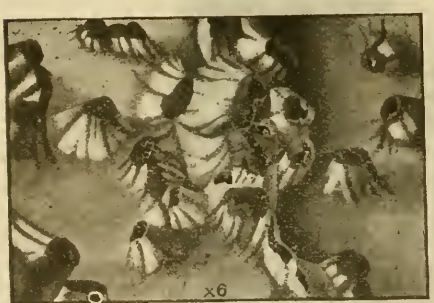

Fig. 104.—*Opisthoscelis mammularis*, Froggatt. ♀ Galls.

Male galls generally in groups of three or four, somewhat similar in form, but smaller and more conical.

Adult female dull yellow to brown in colour; cephalic and thoracic segments large; abdominal segments very small, narrow, clothed with long curly white hairs; those round the anal tail shorter and straight; the tip of the anal segment bearing two small reddish brown spines curved backwards. Hind legs well developed; tarsal joint three times the length of the tibiæ.

155. *Opisthoscelis mammularis.* Cat. Coccidæ, p. 47.

Opisthoscelis maskelli, Froggatt (Fig. 105).

Pro. Linn. Soc. N.S.W., vol. viii, p. 340, pl. xvii, figs. 6–9, 1893.
Agric. Gazette N.S.W., vol. ix, p. 497, 1898.

This is the common gall in the vicinity of Sydney upon the foliage of the large-leaved ironbark (*Eucalyptus siderophloia*).

Female galls like rose thorns, springing from young branchlets, leaf stalks, and the midrib of the leaf; the basal portion green; apical portion brown, with several rings round the apical orifice towards the summit. Height up to half an inch; diameter at base one-third of an inch.

Male galls reddish brown, tubular, broadest at the base, tapering towards the truncate tip, which is ringed with five little teeth; about one-sixth of an inch in height; sometimes single, at other times thickly covering the whole surface of the leaf.

Fig. 105.

Adult female bluish grey, oval; convex on the dorsal surface; abdominal segments small, curving upward; legs black; the tarsal joint long, filiform and turning over the back on either side; tail hidden, short. Under-surface firmly attached to the bottom of the gall. Length, quarter inch; diameter, one-sixth of an inch.

156. *Opisthoscelis maskelli*. Cat. Coccidæ, p. 47.

Opisthoscelis pisiformis, Froggatt.

Pro. Linn. Soc. N.S.W., vol. viii, p. 343, pl. viii, figs. 13–14, 1893.
Agric. Gazette N.S.W., vol. ix, p. 498, 1898.

Female galls upon the leaves, and the male galls upon the leaves and twigs of *Eucalyptus robusta* and *E. resinifera*, Sydney; on *E. melliodora*, Bathurst, New South Wales.

Female galls small, soft green globular excrescences upon the upper surface of the leaf, with the opening enclosed in a reddish wart on the under-surface. Height, one-sixth of an inch.

Male galls conical, brown, broadest at the base, tapering to the truncate apex. Height, one-sixth of an inch. Apical orifice oval, irregular.

Adult female salmon pink, resting on the roof of the gall, slightly attached by head to gall. Head and thoracic segments rounded; the cephalic portion standing out, much wrinkled; abdomen elongate; the last segment produced into a small conical tail, bearing two short recurved reddish spines tipped with black. The dorsal surface and sides fringed with long hairs. Legs long, slender, tarsal joint very long, filiform.

158. *Opisthoscelis pisiformis*. Cat. Coccidæ, p. 47.

Opisthoscelis serrata, Froggatt.

Pro. Linn. Soc. N.S.W., vol. viii, p. 343, pl. xvii, figs. 24–26, 1893.

Agric. Gazette N.S.W., vol. ix, p. 497, 1898.

Female galls upon the foliage of an undetermined species of eucalyptus, Bendigo, Victoria.

Female galls green, tinted with yellow; spherical, constricted at the base, with the opening on the under-surface of the leaf forming an irregular slit in the centre of a wart; soft and spongy. Height and diameter, quarter of an inch. General appearance like that of *O. subrotunda*.

Adult female pale yellow, elongate, rounded; the outer margins of the thoracic and abdominal segments serrate on the dorsal margins, with a row of fleshy teeth right round to the anal extremity, with the body swelling out beneath. Abdominal segments lightly fringed with hairs. Antennæ ferruginous, springing out of the cephalic fold, showing four irregular joints. The fore and middle pair of legs present, but aborted; hind pair well developed with the typical long filiform tarsal joint.

159. *Opisthoscelis serrata*. Cat. Coccidæ, p. 47.

Opisthoscelis spinosa, Froggatt.

Pro. Linn. Soc. N.S.W., vol. viii, p. 34, pl. xvi, figs. 10–12, 1893.

Agric. Gazette, N.S.W., vol. ix, p. 498, 1898.

Male and female galls scattered over the foliage of the large-leafed iron-bark (*Eucalyptus siderophloia*), Flemington, New South Wales.

Female gall shaped like a large rose thorn, dull brown, broad at the base, tapering to the extremity, slightly truncate, with a very small apical opening at the tip. Often scattered about singly on the leaves, but sometimes in clusters of two or three, when they abort the foliage, twisting the leaves round. Height, quarter of an inch; diameter at base, quarter of an inch.

Male galls forming small wrinkled rounded excrescences on the leaves, clustered together or solitary. About one-twelfth of an inch in height. The opening on the underside as in the female galls.

Adult coccid fixed to the bottom of the gall like *O. maskelli*; reddish yellow, the dorsal surface clothed with curly white hairs, interspersed with long ones, forming a fringe round the margins, to the rounded tail. Traces of aborted antennæ, fore and middle legs; hind pair stout, mottled with yellow and black; tarsal joint very long and slender. The gall has a somewhat similar form to that of *O. maskelli*, but is easily distinguished from the latter in always being on the leaf, and having no rings round the apex.

160. *Opisthoscelis spinosa*. Cat. Coccidæ, p. 47.

Opisthoscelis subrotunda, Schrader (Fig. 106).

Trans. Ent. Soc. N.S.W., vol. i, p. 7, pl. iii, figs. 1-o, 1862.

Signoret, *Ann. Soc. Ent. France* (5), vol. vi, p. 579, 1876.

Froggatt, *Pro. Linn. Soc. N.S.W.*, vol. viii, p. 210, 1893.

Opisthoscelis globosa, Rubsaamen, *Berl. Ent. Zeit*, Bd. xxxix, p. 214, f. xv, figs. 1–14, 1894.

This is the common typical species, often covering the foliage of *Eucalyptus capitellata* and several other species on the coastal districts, and found on *Eucalyptus rostrata*, Hay, N.S.W. Rounded green galls, usually perfectly round to the attachment to the leaf; they vary in size up to half of an inch in diameter. The basal opening is situated in the centre of a reddish wart on the underside of the leaf. The male galls much smaller, resemble those of the females, but are not so regular in form.

Fig. 106.—*Opisthoscelis subrotunda*, Schrader

Adult coccid reddish yellow to brown, covered with fine close hairs and white meal; almost round, but tapering slightly to the anal tail; dorsal surface rounded; abdominal segments well defined; no fore or middle legs; hind pair well developed; tarsal joint as long as or longer than the tibia. The whole insect fitting close within the gall chamber, with the peg-like anal appendage closing the basal orifice. Schrader briefly mentions a second species under the name of *Opisthoscelis gracilis*, but I think that it was only a smaller or immature form of *O. subrotunda*, as the galls are very variable, even upon the same trees.

162. *Opisthoscelis subrotunda*. Cat. Coccidæ, p. 48.

Opisthoscelis verrucula, Froggatt.

Pro. Linn. Soc. N.S.W., vol. viii, p. 338, pl. xvii, figs. 3–5, 1893.

Agric. Gazette, N.S.W., vol. ix, p. 498, 1898.

The male and female galls upon the leaves of an undetermined species of Eucalyptus, growing at Napoleon Reef, near Bathurst, New South Wales.

Female galls green, nipple-shaped, slightly corrugated, single or in threes and fours; opening on the underside of the leaf. Height, quarter of an inch; diameter at base, one-sixth of an inch.

Male galls forming smaller wart-like excrescences, slightly conical at the centre; single or in groups of two or three; often aborting the whole leaf into a thickened mass.

Adult female bright red; upper surface circular, slightly concave, covered with white down. Under surface much wrinkled; segmental division distinct; apical segment with an anal ring, and four curved spines, forming a tail. Hind legs large, stout, tarsal joints as long as the whole coccid.

162. *Opisthoscelis verricula*. Cat. Coccidæ, p. 47.

Genus XLV. *Ascelis*, Schrader.

Trans. Ent. Soc. N.S.W., vol. 1, p. 7, pl. iii, fig.s. p–x, 1862.
Signoret, *Ann. Soc. Ent. France* (5), vol. vi, p. 598, 1876.
Cockerell, *Canadian Entomologist*, vol. 31, p. 276, 1899.

The adult female coccids forming globose, or flattened blister-like excrescences on the surface of the foliage of different species of eucalypts, with the opening on either the upper or under surface of the infested leaf. The males form no separate galls, but the male larvæ remains in the parent gall, in which they go through their metamorphosis. The larvæ are closely allied to those of the genus *Ophisthoscelis*, are usually bright red, but have the basal portion of the abdomen more slender. The adult coccid is simply an irregularly rounded mass of yellowish jelly, enclosed in a delicate skin, with no legs or antennæ; the anal segment produced into a slender cylindrical tube or tail, simple or terminating in fringe like processes, which fit into the anal aperture in the gall.

Schrader's definition of the genus is simply a description of the type species (*Ascelis praemollis*), but it can be easily enlarged to include the other two species. Cockerell has placed in this genus the remarkable gall-making coccid which I placed in the genus *Brachyscelis*, and for which Fuller created his genus *Cystococcus*. I have replaced it in Fuller's genus, as it is not an *Ascelis*, and certainly stands quite alone, and is worthy of generic rank.

In Mrs. Fernald's catalogue, *Tachardia melaleuca*, Fuller, is listed under the name of *Ascelis melaleuca*.

Ascelis attenuata, Froggatt.

Pro. Linn. Soc. N.S.W., vol. viii, p. 214, pl. viii, figs. 4–4*a*, 1893.
Agric. Gazette N.S.W., vol. ix, p. 496, 1898.

Blister galls upon, and aborting, the foliage of *Eucalyptus piperita* at Hornsby, New South Wales. The galls are circular cavities in the leaf, the presence of the coccid causing the infested tissue to thicken, and yellow on both sides; the galls slightly raised above the surface of the leaf tissue, with a tiny apical orifice in the centre on the upper surface of the leaf. About one twenty-fourth of an inch in diameter.

Adult female pale yellow; an irregularly rounded, wrinkled mass, without any definite appendages; legs and antennæ wanting; anal tail very long, cylindrical, truncated at the tip, and encircled at the base, with a dark brown ring.

163. *Ascelis attenuata*. Cat. Coccidæ, p. 48.

Ascelis praemollis, Schrader (Fig. 107).

Trans. Ent. Soc. N.S.W., vol. i, p. 7, pl. iii, figs. p–x, 1862.
Signoret, *Ann. Soc. Ent. France* (5), vol. vi, p. 599, 1876.
Froggatt, *Pro. Linn. Soc. N.S.W.*, vol. viii, p. 211, 1893.
Natural Science, vol. v, p. 113, 1894.
Agric. Gazette N.S.W., vol. ix, p. 496, 1898.

The galls are common upon the foliage of the bloodwood (*Eucalyptus corymbosa*) in the coastal districts of this State.

The galls are round, varying from half to three-quarters of an inch in diameter; green reddish or dull yellow, growing upon the leaves, either singly, or in groups of two or three, and often quite aborting the infested leaves. The chamber containing the female coccid is at the base of the fleshy galls, with the small basal orifice opening out on the underside of the leaf. Adult female about one-sixth of an inch in diameter, consisting of a shapeless irregularly rounded pale yellow mass, with no signs of legs or antennæ; the anal appendage stout, cylindrical, dark brown, surrounded at the base with a dark ring; at the apex there are three slender finger-like projections, holding a mass of gummy secretion, which protects the opening.

Fig. 107.—*Ascelis praemollis*, Schrader.

166. *Ascelis praemollis*. Cat. Coccidæ, p. 48.

Ascelis schraderi, Froggatt (Fig. 108).

Pro. Linn. Soc. N.S.W., vol. viii, p. 213, 1893.
Agric. Gazette N.S.W., vol. ix, p. 495, 1898.

This is the flattened blister gall upon the foliage of the bloodwood *Eucalyptus corymbosa*, found in similar localities as *A. praemollis* in the coastal districts of New South Wales, but I have never found both these species upon the same tree.

The adult female gall is an irregular rounded blister about half an inch in diameter, and swelling out slightly on either side of the surface of the leaf; the aborted tissue varies from pale yellow to reddish brown, with the apical orifice small, circular, and on the upper surface of the leaf.

The adult coccid is similar in form and structure to that of the preceding species, but slightly larger and more flattened; the anal appendage more slender than in *A. praemollis;* apparently solid, truncate at the tip, and while fitting into the apical orifice, not quite level with the surface of the surrounding tissue.

Schrader notices this gall in his paper, but apparently considered it to be a variety or abnormal form of his *A. præmollis*.

167. *Ascelis schraderi*. Cat. Coccidæ, p. 48.

Fig. 108.—*Ascelis schraderi* on *Eucalyptus corymbosa*.

Genus XLVI. *Cystococcus*, Fuller.

Journal W. Australian Bureau Agriculture, vol. iv, p. 1346, 1897.

Trans. Ent. Soc. London, p. 462, 1899.

Fuller defined this genus as follows, in a description of the type: "*C. echiniformis*—Adult female yellow cyst-like; legs and antennæ absent, mouth present, abdomen tapering, ending in a hard black button. There are four black secreting orifices from which filaments protruded near the apex. Gall spherical, orifice at apex, diameter three-quarters to one and a quarter inch; walls thin and granulated."

I leave this unique species in the sub-family *Brachyscelinae*, on account of the typical gall and general structure of the female coccid, considering the thimble-shaped anal extremity as analogous with the more distinct tails of *Apiomorpha* and *Ascelis*.

Cystococcus pomiformis, Froggatt (Fig. 109).

Brachyscelis pomiformis, *Pro. Linn. Soc. N.S.W.*, vol. vii, p. 367, pl. vii, f. 7, 1892.

Cystococcus echinoformis, Fuller, *Journ. W. Aust. Bureau Agri.*, vol. iv, p. 1346, 1897.

Trans. Ent. Soc. London, p. 462, pl. xv, 1899.

Ascelis echinoformis, Cockerell, *Canadian Entomologist*, vol. xxxi, p. 276, 1899.

This remarkable gall is recorded from north-west Australia (King's Sound) on *Eucalyptus tesselatus*, Torrens Creek, North Queensland, and Tennant's Creek, Central Australia, upon undetermined species of eucalpyts.

Galls apple-shaped, sessile on slender twigs, up to two and a half inches in diameter, and one and a half inches in height, with a deep depression on the summit, in the centre of which is the circular apical orifice. General colour greyish brown, the outer surface often roughened or granulated; the walls of the gall about a quarter of an inch in thickness, so that the gall chamber is very large, inner surface with a smooth hard shell, with an inverted funnel-like process at the apex of the chamber below the apical orifice.

Adult female dull yellow, with the cephalic portion and abdomen spotted and mottled with reddish brown; the anal extremity smooth, shining black, rounded at the tip. The female occupies the centre of the gall chamber, with the apex of the cephalic portion striated, and attached to the bottom of the gall, with the tip of the abdomen fitting into the funnel-shaped structure at the summit of the chamber. The thoracic segments deeply corrugated, showing black spots indicative of the larval legs; the abdominal segments

cylindrical, tapering to the blunt rounded tip; first and second segments slightly rugose, with fine parallel striations. Length up to one inch. The males develop in the female gall. This is one of the most remarkable gall insects in the world in the final stage of the adult female, having no apparent mouth, antennæ, legs, or anal appendages, while she is fixed on

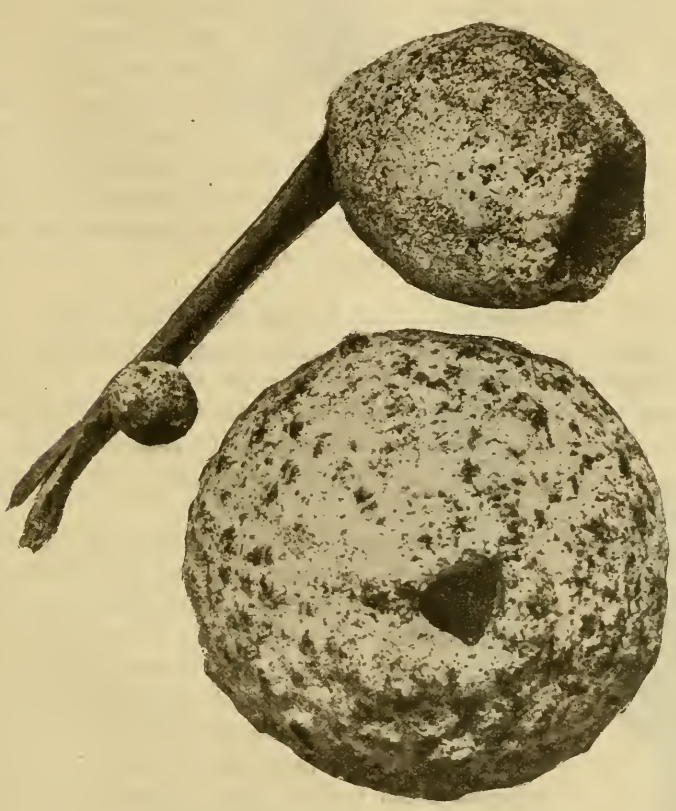

Fig. 109.—*Cystococcus pomiformis*, Froggatt.

the centre of the large chamber standing on her head. These galls are known as "bloodwood apples" in North Queensland, and in Central Australia the natives collect them and eat the enclosed coccid.

The type specimen came from North Queensland, and was described on the gall and the remains of a female coccid as a *Brachyscelis*; though the gall is very like that of a *Brachyscelid*, the adult female is quite distinct from any of that genus.

164. *Ascelis echiniformis*. Cat. Coccidæ, p. 48.

Genus XLVII. *Frenchia*, Maskell.

Trans. N. Zealand Institute, vol. xiv, p. 56, 1891.

Two species of these remarkable coccids have been described infesting the branchlets of several species of sheoaks (*Casuarina*).

Maskell defines the genus as follows: "Females excreting a tubular, smooth, woody test, which entirely covers them; also at gestation forming an inner waxy indusium, closely attached to the insect; also producing gall-like swellings or excrescences in the twigs of the food plant. Abdomen distinctly prolonged. Adult female coccid with aborted rostrum, and no legs or antennæ, the anogenital ring obscure, or only represented by a simple orifice. Segmentation of the abdominal segments irregular, with many transverse corrugations; surface covered with circular spinnerets and slender hairs; abdomen terminating in a slender point."

Frenchia casuarinae, Maskell (Fig. 110).

Trans. N. Zealand Institute, vol. xxiv, p. 57, pl. xiii, figs. 1–16, 1891.
Froggatt, *Agric. Gazette N.S.W.*, vol. ix, p. 495, 1898.

The coccid has a very wide range over the coastal districts of Victoria and New South Wales upon *Casuarina equisetifolia*, *C. quadrivalis* and other species of sheoaks. Lea records it as common on similar *Casuarinas* in Tasmania.

Fig. 110.

Galls first forming an oval swelling upon the side of the twig, varying in size and form, according to the number of coccids that make a lodgment in the bark; from the centre of this, with the base in the wood, springs upward, a stout dark-brown cylindrical tube broadest and loosely attached at the base in the gall swelling, where it is hidden in the tissue of the aborted wood, but with the projecting portion of a uniform thickness about half an inch in length and a quarter of an inch in diameter, where it emerges from the basal gall, tapering often to a conical apex, with a central apical orifice.

Adult female coccid covered with a mealy secretion, afterwards becoming waxy; at first reddish yellow, then bright red, and finally dark-brown; cephalic portion circular, disc-like, the thoracic and abdominal segments tapering up into a slender tail, fitting in the tubular gall. Mouth aborted, legs and antennæ wanting; anal segment of the abdomen terminating in a slender point. Maskell compares it to a little tadpole in general form.

116. *Frenchia casuarinæ*. Cat. Coccidæ, p. 39.

Frenchia semiocculta, Maskell (Fig. 111).

Trans. N. Zealand Institute, vol. xxvii, p. 70, pl. vii, figs. 9–19, 1894.
Froggatt, *Agric, Gazette N.S.W.*, vol. ix, p. 495, 1898.

This species is found upon the branchlets of various species of sheoaks (*Casuarina*), growing at Thornleigh and Manly, New South Wales.

Fig. 111.—
Frenchia semicocculta, Maskell.

In this species the male coccids cause distinctive galls, or swollen corrugations on the branchlets, congregating in clusters of half a dozen or more, forming a chamber with a terminal orifice above, about one-twelfth of an inch in height, between two swollen, thickened lips, swelling out of the bark. The female hides under the bark, forming a circular tubular opening above, through which she projects her tail.

Adult female yellowish, tinged with red to dull red, about one-tenth of an inch in diameter; before gestation the body is subcircular and not half the size, ventral surface convex, rostrum upon a boss in the centre, very small; legs and antennæ wanting. From the centre of the dorsal surface springs the tail, which is bluntly rounded at the tip. After treatment in potash a hairless anal ring and two minute spines are seen near the tip.

117. *Frenchia semiocculata*. Cat. Coccidæ, p. 39.

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